AVIATION WEEK

50 CENTS

Grumman

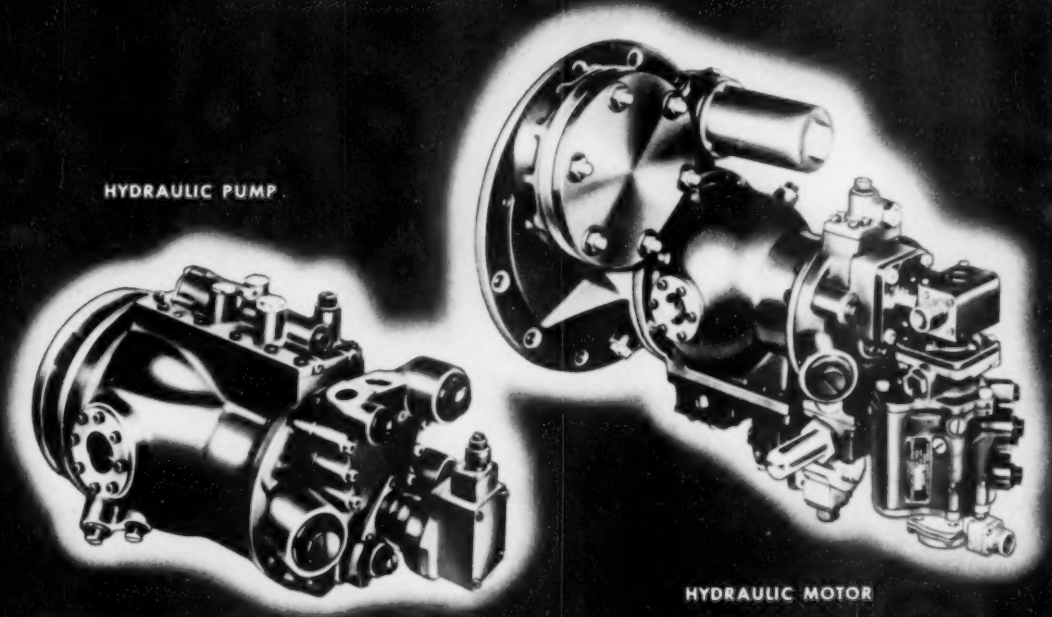
NEW "CAT" IN THE SKY

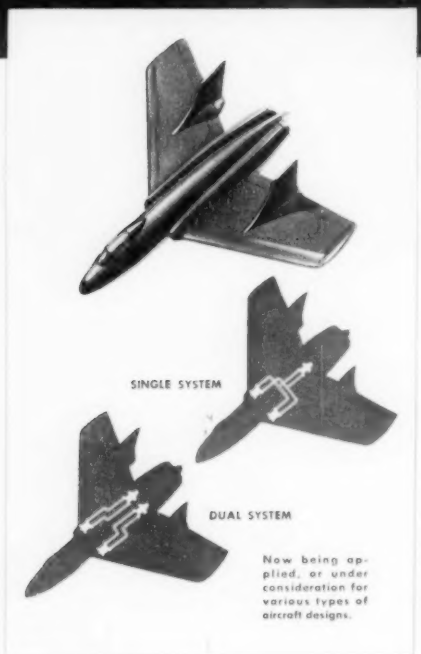
Now the COUGAR, a sleek, swept-wing successor to the battle proved PANTHER, takes its place in a long line of famous Grumman fighters. Ruggedness and reliability are inherent in this newest turbo-jet. These are traditional Grumman characteristics that Navy and Marine pilots have used to advantage since early World War II days when WILDCATS were clawing Jap Zeros.

GRUMMAN AIRCRAFT ENGINEERING CORPORATION, BETHPAGE, LONG ISLAND, NEW YORK

Contractors to the Armed Forces

SUNDSTRAND "SPLIT DRIVE" TYPE CONSTANT SPEED DRIVES





...single or dual systems!

With the hydraulic pump mounted on the aircraft engine accessory pad and the hydraulic motor attached to the alternator, remotely located in the airframe, this type of Sundstrand Constant Speed Drive permits maximum aircraft design flexibility. Pumps may be mounted on two or more engines and their output combined to drive a single hydraulic motor with its attached alternator, or each pump may be used to drive a single hydraulic motor with its alternator. This Split System also may be used to drive other accessories such as hydraulic pumps and DC generators, or used for starting the main engines by applying a source of electrical energy to the alternator. The alternator running as a synchronous motor will cause the hydraulic mechanism to feed back energy to start the engine. Get complete data—investigate Sundstrand's *reliable* research, *expert* engineering, and *precision* production.

SUNDSTRAND

SUNDSTRAND AIRCRAFT HYDRAULICS

SUNDSTRAND MACHINE TOOL CO.
HYDRAULIC DIVISION, ROCKFORD, ILL.

AIRCRAFT AND INDUSTRIAL HYDRAULIC TRANSMISSIONS, PUMPS, MOTORS, AND VALVES • OIL BURNER PUMPS • AIR SANDERS
LATHES • MILLING, BROACHING AND SPECIAL MACHINES • BROACHING TOOLS • MAGNETIC CHUCKS

B.F.Goodrich

De-Icers for fighters in Korea designed and tested in 21 days

ENGINEERS didn't think it could be done—fasten a De-Icer to the wing leading edge of *high-speed aircraft*. Okay on airliners and cargo ships and level-flying bombers. But in power dives and fast climbs of fighter combat, would De-Icers ever stay on? Wouldn't they foul up the planes' flight characteristics?

But after experience with icing conditions in Korea, the Navy decided they *had* to find a way to protect their fighter planes from ice. The plane manufacturers, the Navy and B. F. Goodrich put their heads together. For the Douglas Skyraider (bottom photo) design, production and first tests with a new kind of De-Icer took 32 days. For Chance Vought's Corsair (top photo) the time was 21 days. Net results of the tests: Even in high-speed dives, the new De-Icers came through without a sign of damage; there were no appreciable effects on flight characteristics.

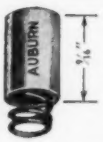
The speed of these two installations and their successful performance resulted from the backlog of years of research and development with BFG pneumatic De-Icers. New cements were ready. The entire surface was cemented to the wing. There was also an extra screwed-on fairing strip for further reinforcement.

The new BFG De-Icers operate safely at 15 to 18 lbs. pressure. They are light in weight, yet tough and long-lasting. Take up little space for their plumbing. Are easily maintained. B. F. Goodrich engineers have the longest, most complete background of experience in the field of airplane ice protection. For help in your aircraft icing problems, write *The B. F. Goodrich Company, Aeronautical Division, Akron, Ohio.*

B.F.Goodrich
FIRST IN RUBBER

Auburn SPARK PLUG CONNECTORS

for aircraft



for 7 mm cable
1041-C Steatite
1041-M Mycalex
1041-D Alumina
(AN 4164-2)

for 7 mm cable
1099-C Steatite
1099-M Mycalex
1099-F Phenolic
1099-D Alumina
(AN 4164-1)

9/16" and 1" sleeves only, without springs, are also available

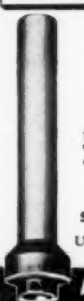
TERMINAL COLLARS
1042 Neoprene
1043 Silicone
Used with all 9/16" connectors on 7 mm cable

for military trucks and tanks

for 5 mm cable
SP420 Steatite
CC4025 Mycalex
CC4006 Alumina

for 5 mm cable
CC4017 Steatite
CC4020 Mycalex
CC4013 Alumina

9/16" and 11/16" sleeves only, without springs, are also available



Neoprene or Silicone Grommets
AD51-960
Used with all 11/16" connectors on 5 mm cable

AD50-894
Used with all 9/16" connectors on 5 mm cable

AA50-313
Spring Assembly
Used with all 9/16" and 11/16" connectors for 5 mm cable

AUBURN SPARK PLUG
Co. Inc., Auburn, N.Y.

Aviation Week

ABP Member ABC

Volume 56 **April 21, 1952** **Number 16**

Headline News

AMC Decentralizes Wright Buying....12
Power Failure Blamed in Crash.....14
Fairchild Modifies Navy R4Q Packet..14
Wetmore to Leave Smithsonian.....14
LAA S-55 Cracks Up.....15
Steel Pact Won't Upset Aircraft Pay..16
Safety Decision Revised by CAB.....16
AF Captain Charged.....17
Tiptanks to Widen R7V-2 Range.....17
New Navy Air Role Tested in Korea..18

Aeronautical Engineering

Duo-Mono Configuration Stall-Proof...22
NACA Technical Committee Heads.....42
Seaplane Sports Quick-Change Hull...46

Financial

Rising Costs Race Big Four Income...50

Equipment

Pictorial Computers Evaluated.....55

Production

Automatic Tools Work Jet Metals....70
Certificate of Necessity.....75

Avionics

AF Testing Avionic Altimeters.....77

Air Transport

CAB Vetoes Route Sales in Merger....91
Split CAB Decision Hikes Air Fares..92
Australia to Buy Jet Transports.....92
Trunklines List Top Salaries.....92
Nonskeds in Bid for Military Traffic..94
CAB Charges Against Airline.....94

Editorial

Letters on CAA.....104

Departments

News Digest..... 7
Aviation Calendar..... 8
Washington Roundup..... 9
Who's Where.....11
Industry Observer.....11
Thrust & Drag.....40
NACA Reports.....49
New Aviation Products.....66
Production Briefing.....72
Letters.....86
Shortlines.....96

41,834 copies of this issue printed

Robert H. Wood
EDITOR

Merlin H. Mickel.....MANAGING EDITOR

William Kroger.....Assistant Managing Editor
Alexander McSurely..Assistant Managing Editor
Ben Lee.....Military Editor
G. L. Christian III.....Equipment & Maintenance
David A. Anderton.....Engineering Editor
F. Lee Moore.....Transport
Katherine Johnsen.....Congress
Philip Klass.....Avionics
Henry Lefer.....News Desk
A. W. Bentz.....News Desk
Scott H. Reiniger.....Editorial Assistant
Victoria Giaculli.....Editorial Assistant
Erwin J. Bulban.....Special Assignments
Leo T. Tarpey.....Editorial Makeup

Editorial Offices: 330 West 42nd St., New York 36, N. Y., Phone Longacre 4-3000, or (night) 4-3035; National Press Bldg., Washington 4, D. C., Phone National 3414.

Domestic News Bureaus: Atlanta 3, 1321 Rhodes-Haverty Bldg.; Chicago 11, 520 N. Michigan Ave.; Cleveland 15, Hanna Bldg.; Detroit 26, Penobscot Bldg.; Los Angeles 17, 1111 Wilshire Blvd.; San Francisco 4, 68 Post St.; Houston, 514 South St. *Correspondents* in more than 60 major cities.

Foreign News Bureaus: London, Paris, Frankfurt, Tokyo, Bombay, Melbourne, Rio de Janeiro, Mexico City. *Correspondents* in more than 59 major cities.

Aviation Week is served by PRESS ASSOCIATION, INC., a subsidiary of Associated Press.

Robert F. Boger
PUBLISHER

R. W. Martin, Jr., *Advertising Sales Manager*; J. G. Johnson, *Business Manager*; Mary Kiernan, *Research and Marketing*; Sales Representatives: J. C. Anthony, New York; H. P. Johnson, Cleveland; L. J. Biel, Chicago; W. E. Donnell, St. Louis; F. P. Blanchard, Jr., Boston; James Cash, Dallas; R. C. Maultsby, Atlanta; R. F. Dorland, Jr., San Francisco; C. F. McReynolds, Los Angeles. Other sales offices in Pittsburgh, Philadelphia, Detroit, London.

April 21, 1952 AVIATION WEEK Vol. 56—No. 16
Member ABC and ABP

Published weekly by McGraw-Hill Publishing Company, Inc., James H. McGraw (1860-1948), Founder. **Publication Office: 99-129 North Broadway, Albany 1, N. Y.**

Executive, Editorial and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York 36, N. Y. Curtis W. McGraw, President; Willard Chevalier, Executive Vice-President; Joseph A. Gerardi, Vice-President and Treasurer; John J. Cooke, Secretary; Paul Montgomery, Senior Vice-President, Publication Division; Ralph B. Smith, Editorial Director; Nelson Bond, Vice-President and Director of Advertising; J. E. Blackburn, Jr., Vice-President and Director of Circulation.

Subscriptions: Address correspondence to AVIATION WEEK—Subscription Service, 330 W. 42nd St., New York 36, N. Y. Allow ten days for change of address.

Subscriptions are solicited only from persons having a commercial or professional interest in aviation. Position and company connection must be indicated on subscription orders.

Single copies 50¢. Subscription rates—United States and possessions, $6 a year; $9 for two years; $12 for three years. Canada, $8 a year; $12 for two years; $16 for three years; payable in Canadian currency at par; other Western Hemisphere, $10 a year; $16 for two years; $20 for three years. All other countries $20 a year; $30 for two years; $40 for three years. Entered as second-class matter, July 16, 1947, at the Post Office at Albany, N. Y., under Act of Mar. 3, 1879.

Printed in U. S. A. Copyright, 1952 by McGraw-Hill Publishing Co., Inc.—All Rights Reserved. Cable address: "McGraw-Hill New York." Publications combined with AVIATION WEEK are AVIATION, AVIATION NEWS, AIR TRANSPORT, AERONAUTICAL ENGINEERING and AIRCRAFT JOURNAL. All rights to these names are reserved by McGraw-Hill Publishing Co.

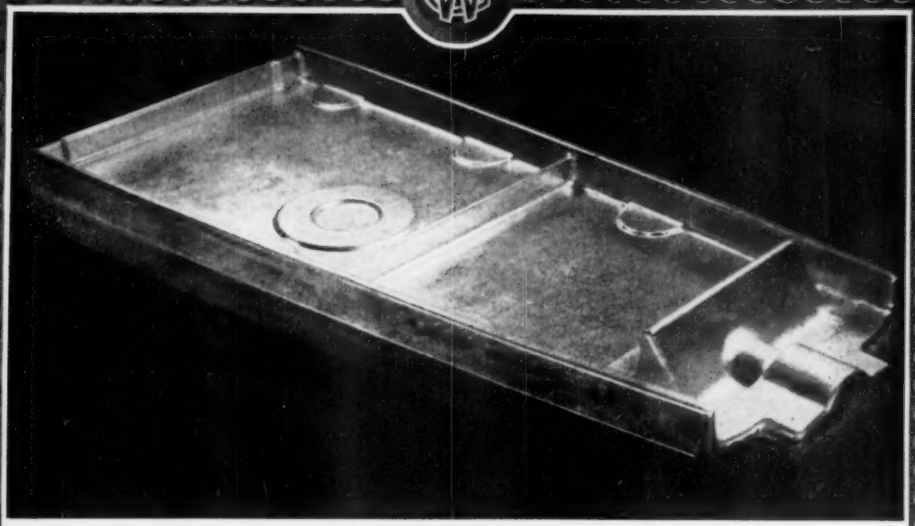
NORTHROP

11 YEARS

FAFNIR

Northrop Aircraft Inc. . . . makers of the Scorpion F-89, first jet all-weather intercepter in production . . . use Fafnir Ball Bearings to help achieve the astonishing maneuverability and agility of this 38,000 pound ship. For over 11 years, Fafnir Ball Bearings have been standard components in Northrop aircraft. Something more than good ball bearings accounts for this relationship. It's the Fafnir attitude and aptitude . . . a way of looking at ball bearings from the designer's viewpoint, an aptitude gained from 23 years' specialization in aircraft ball bearings. The Fafnir Bearing Company, New Britain, Connecticut.

Fafnir Ball Bearing Rod Ends, one of the Fafnir Ball Bearing units regularly specified by Northrup Aircraft Inc., Light, compact design . . . outer race ground directly on shank member. Special heat treatment, an exclusive Fafnir feature, insures shank toughness— eliminates brittleness and cracking. Inner race extension beyond face obviates need of spacers.



Are you taking full advantage of the constantly growing range of forgings? Typical is this aluminum alloy forging with a projected area of more than 1,000 square inches used in the wing structure of a modern military bomber. Such forgings are today made possible by the use of the largest die forging press in America (18,000 tons). For hammer or press die forgings of aluminum, magnesium or steel, Wyman-Gordon engineers are ready to serve you—there is no substitute for Wyman-Gordon experience.

Standard of the Industry for More Than Sixty Years

WYMAN-GORDON

FORGINGS OF ALUMINUM • MAGNESIUM • STEEL

WORCESTER, MASSACHUSETTS

HARVEY, ILLINOIS DETROIT, MICHIGAN

NEWS DIGEST

DOMESTIC

First flight of Gyrodyne Company of America's Model 2C coaxial copter was made Apr. 11 with Pilot Jim Ryan keeping the craft aloft for about an hour.

Convair B-36 crashed and burned on takeoff from Fairchild AFB, near Spokane, Apr. 15, killing 15 of the 17 men aboard. This was the sixth B-36 the Air Force has lost.

Bendix Aviation Corp. has purchased exclusive production and marketing rights for the Northrop Aircraft, Inc., Maddida electronic computer. Sale includes all capital assets of Northrop's computer manufacturing department.

Dr. Edward P. Warner, president of the International Civil Aviation Organization, has been awarded the Gold Medal of the Federation Aeronautique International for "meritorious contributions to the progress and development of U. S. and world aviation." Col. Fred J. Ascani, USAF, was awarded FAI's de La Vaulx Medal for his speed mark of 635.686 mph. established during last year's National Air Races, Detroit. Miss Caro Bayley was honored with the Bleriot Medal for altitude performance of 30,203 ft. in a Piper Super Cub in January, 1951.

Maj. Gen. Francis H. Griswold has been appointed commanding general of the 3rd Air Force in Britain, exchanging posts with Maj. Gen. Frederick R. Dent, who has been given Griswold's former duty as military director of production and procurement, Munitions Board.

American Airlines' Convair lost wing leading edge skin between fuselage and nacelle while flying in severe turbulence at night en route from Boston to Buffalo. Plane made emergency landing at Rochester, N. Y., and transferred all 30 passengers to another Convair. AA is centering its investigation on the fasteners which hold the removable leading edge in place.

FINANCIAL

Chicago & Southern Air Lines reports a $206,653 net profit during the first quarter of 1952, a 73.8% gain over the same period in 1951. Operating revenues were up 23.9%.

Lear, Inc., Grand Rapids, Mich., set a company postwar record of $8.5 million in shipments for the first quarter of 1952, just $100,000 short of first six-months' total last year. Backlog is approximately $58 million.

Delta Air Lines has voted a 25-cent-per-share dividend payable June 2 to holders of record on May 15.

Hawaiian Airlines made a $39,194 profit after taxes in 1951 following a 1950 loss of $57,344.

Bell Aircraft Corp., Buffalo, N. Y., reports 1951 net profit after taxes of $1,927,639 on sales of $82,371,336. Backlog is $369 million.

Capital Airlines recorded a net profit of $1,756,490 after taxes during 1951 against 1950's net of $1,066,841.

Northwest Airlines earned a profit of $1,785,671 after taxes in 1951. Revenues from passengers, freight, express and mail totaled $47.3 million.

Flying Tiger Line notes air freight revenues of $1,297,000 for the first quarter of 1952, compared with $1,057,000 for the first quarter of 1951. Carrier's load factor during the first quarter of this year was 81.9%.

Consolidated Vultee Aircraft Corp., San Diego, reports a net income of $1,458,117 after federal income taxes for the quarter ended Feb. 29, on sales of $86,561,144.

Slick Airways, Inc., reports earnings of $352,979 for 1951 after federal income tax refund of $15,000. Gross revenues totaled $12,914,283. Ton miles during last year were 67,890,612, 48.8% over 1950.

INTERNATIONAL

Martin 2-0-2, operated by Japan Air Lines under lease from Northwest Airlines, crashed into Mihara volcano, 65 miles south of Tokyo, Apr. 9, killing all 37 aboard.

Avianca, Colombian airline, has signed option with Lockheed Aircraft Corp., for three 90-seat Super Constellations to cost $6 million. Option runs until Apr. 30. Avianca will pay one-third cash, remainder to be financed by Bank of America, Calif.

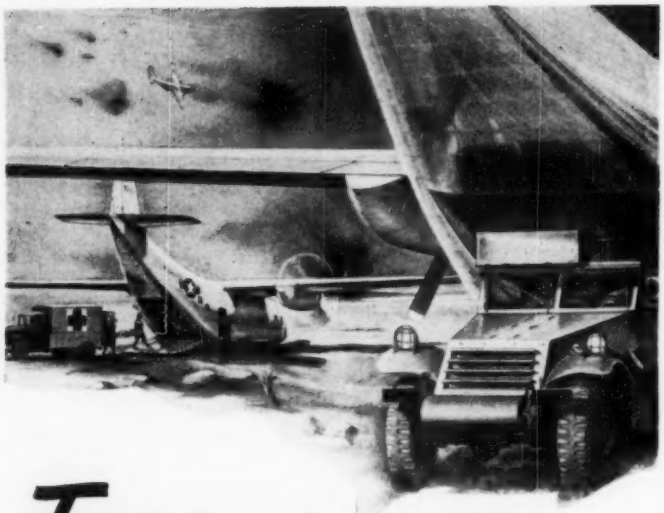
Three Super Constellations have been ordered by the Spanish airline, Iberia, for contemplated nonstop Madrid-New York service. Iberia plans to acquire 4 Bristol 170 transports for domestic use.

Consult your 1952 I.A.S. "Aeronautical Engineering Catalog"

for complete information on AIRBORNE'S

ROTORette — LINEATOR — ROTORAC & TRIM-TROL ELECTRO-MECHANICAL ACTUATORS. Also ANGLgear RIGHT-ANGLE BEVEL GEAR UNITS.

AIRBORNE
ACCESSORIES CORPORATION
1414 Chestnut Avenue
Hillside 5, New Jersey
© A.A.C.



Troops out.. Transport in

APPROVED AND ACCEPTED BY U.S.A.F.

Chase Assault Transports, keeping pace with the furious tempo of modern warfare, can deliver troops and equipment directly to forward combat areas **by *landing***—can rush casualties from front lines to rear area hospitals.

Demonstrations of this technique which were conducted at Exercise "Southern Pine" last summer, clearly emphasized Avitruc superiority. No other aircraft can match their performance – no other planes can fill this vital role.

Chase Assault Transports are the answer to speedy delivery of troops or equipment and the fast evacuation of wounded troops to areas of safety.

Chase AIRCRAFT CO., Inc.
WEST TRENTON, NEW JERSEY
STROUKOFF AVITRUC

AVIATION CALENDAR

Apr. 21-24—National Aeronautics Meeting and Aircraft Engineering Display, Society of Automotive Engineers, Hotel Statler, New York; technical air review at Idlewild, Apr. 24.

Apr. 22—Institute of the Aeronautical Sciences meeting, Cleveland-Akron section, Cleveland.

Apr. 28—International Air Transport Assn. Warsaw Convention special committee meeting, Bermuda.

Apr. 30-May 2—American Institute of Electrical Engineers northeastern district meeting, Arlington Hotel, Binghamton, N. Y.; aviation papers Apr. 30.

May 2-4—California Aviation Education Assn. annual meeting, Los Alamitos NAS, Long Beach.

May 3-4—Sixth annual Intercollegiate Air Meet, Great Barrington, Mass.; if rain, May 10-11.

May 5-7—Symposium, "Progress in Quality Electronic Components," sponsored by Institute of Radio Engineers, American Institute of Electrical Engineers, and Radio & Television Manufacturers Assn.; technical sessions at Dept. of Interior auditorium; registration at Roger Smith Hotel, Washington, D. C.

May 5-16—International Air Transport Assn. technical conference meeting, Copenhagen.

May 8-9—Fifth annual Wisconsin Aeronautics Conference, Hotel Northland, Green Bay.

May 11—International Air Transport Assn. traffic committee meeting, Buenos Aires.

May 12-14—National conference on airborne electronics, co-sponsored by Institute of Radio Engineers' Dayton section and Professional Group on Airborne Electronics, Dayton Biltmore Hotel, Dayton, Ohio.

May 14—National aircraft technical committee, Aircraft Industries Assn., meeting, Hotel Statler, Washington, D. C.

May 14-16—Society for Experimental Stress Analysis national meeting, Hotel Lincoln, Indianapolis.

May 15-16—American Helicopter Society annual forum and banquet, Hotel Washington, Washington, D. C.

May 17-18—National Pilots Air Meet and Races, Chattanooga.

May 19—International Air Transport Assn. technical committee and medical committee meeting, Copenhagen.

May 31—Philadelphia Aviation Country Club annual spring regatta, Wings Field, Ambler, Pa.

June 1-6—Society of Automotive Engineers summer meeting, Ambassador and Ritz-Carlton Hotels, Atlantic City, N. J.

June 3—Council for military aircraft standards, Aircraft Industries Assn., meeting, Hotel Statler, New York.

June 9-13—National Fire Protection Assn. annual meeting; aviation seminar on June 10, Hotel Statler, New York.

PICTURE CREDITS

13—Piasecki; 14—Fairchild Aircraft; 15—Bell Aircraft; 17—Lockheed; 18, 21—USN; 24—McGraw-Hill World News; 31—Howard Levy; 75—Solar Aircraft; 87—North American Aviation; 94—BuAer.

Washington Roundup

Further Stretchout?

General congressional move to clamp a ceiling on military expenditures probably would mean another reschedule of aircraft production to slow down ouput.

House not only slashed $4.2 billion off the $50.9-billion military appropriation recommended by the Administration, but limited expenditures for the coming fiscal year, which starts July 1, to $46 billion. This is $6 billion below the contemplated expenditure of $52 billion, much of it from previous appropriations.

• **House's cut of $710 million** in funds for aircraft procurement means a lower volume of contracts over the coming year–which will be reflected in lower output two or three years from now. For aircraft procurement, the House voted: Air Force, $12.1 billion; Naval aviation, $3.8 billion.

• **But the ceiling on spending** would mean lower output over the coming year. Aircraft and other hardware deliveries would have to be kept down so that payments would be within the ceiling.

Appropriations Committee Member, Rep. George Mahon, commented: "The cut in spending from $52 billion to $46 billion simply means that we will get $6 billion less of airplanes, tanks and guided missiles and other hardware than we have been promised by the military services and American industry."

But the House set the expenditure ceiling by a sweeping 220-to-130 vote.

Main reason: Congressmen are apprehensive of the inflationary impact of mounting military spending on the economy. This year's military expenditure of $38 billion is expected to rise sharply over the next few years as production ordered after Korea comes off the lines–unless held down by a legal ceiling.

Money on Hand

Air Force and Navy will have an estimated $36.2 billion for aircraft and related purchasing by July.

The picture:

• Air Force will have $14.4 billion available to finance aircraft already on order, plus an approximate $12.1 billion–the amount voted by the House–for new contracting.

• Naval air will have $5.9 billion available to finance aircraft already on order, plus an approximate $3.8 billion for new contracting.

Vandenberg Reappointment

Reappointment of USAF's Chief of Staff, Gen. Hoyt Vandenberg, is tangled in a technicality.

Senate Armed Services Committee is ready to underwrite Vandenberg's continuation as Chief–but not for the reason given by the White House. The President renominated him for a 14-month term so that he might "round out his full 30 years of military service as Chief of Staff."

Sen. Leverett Saltonstall commented: "It might set a precedent. If the next Chief of Staff is Gen. Curtis LeMay, 45, should we keep him in that post until he reaches retirement age?"

Committee members hope to prod the President into putting forth a different reason for Vandenberg's reappointment.

NACA: Take Over AEDC?

Chairman Carl Durham of the House Armed Services Subcommittee on Research and Development may push legislation turning operation of Arnold Engineering Development Center over to National Advisory Committee for Aeronautics.

House has banned USAF from using funds to pay Aro, Inc. to operate the installation after July 1. An attempt by Rep. Dewey Short to continue the Tennessee corporation's operation failed.

Outlook now is that the Armed Services Committee will investigate two aspects of the center:

• **The Durham Subcommittee** wants to find out why development has lagged. The first facility, the high altitude engine test chamber, originally set for operation by now, won't be ready until mid-May next year. The last facility, the supersonic propulsion windtunnel, originally due for completion by early 1954, won't be in operation until 1957.

• **The Hebert Investigating Subcommittee,** headed by Rep. Edward Hebert, plans to look into possible irregularities in connection with AEDC, taking up where Rep. Albert Gore left off at hearings before the Appropriations Committee.

Plane Trends

Future trend in military procurement may be to cut down the number of types and minimize gadgetry:

• **Secretary of Defense Robert Lovett** has directed Research and Development Board to "ascertain whether or not there are more Air Force and Navy models than necessary, and, if so, to reduce the number."

• **Vice Chief of Air Staff,** Gen. Nathan Twining, reported to House Appropriations Committee: "This country has always overbuilt its aircraft. They are too heavy. We have to get into that and cut the overall weight of equipment down to get performance. The safety factors we have built in . . . we have overdone."

Where They Stand

New friends of air power showed their faces during House debate on the 1953 fiscal year military budget, while some old friends showed different faces:

Massachusetts' Rep. John Kennedy spearheaded an unsuccessful drive to boost funds for USAF aircraft procurement to $13.5 billion to step up achievement of a 143-wing USAF by December, 1954. Under the $12.6 billion recommended by the Administration it wouldn't be achieved until late 1955; and, under the $12.1 billion finally approved by the House, it would not be until late 1956.

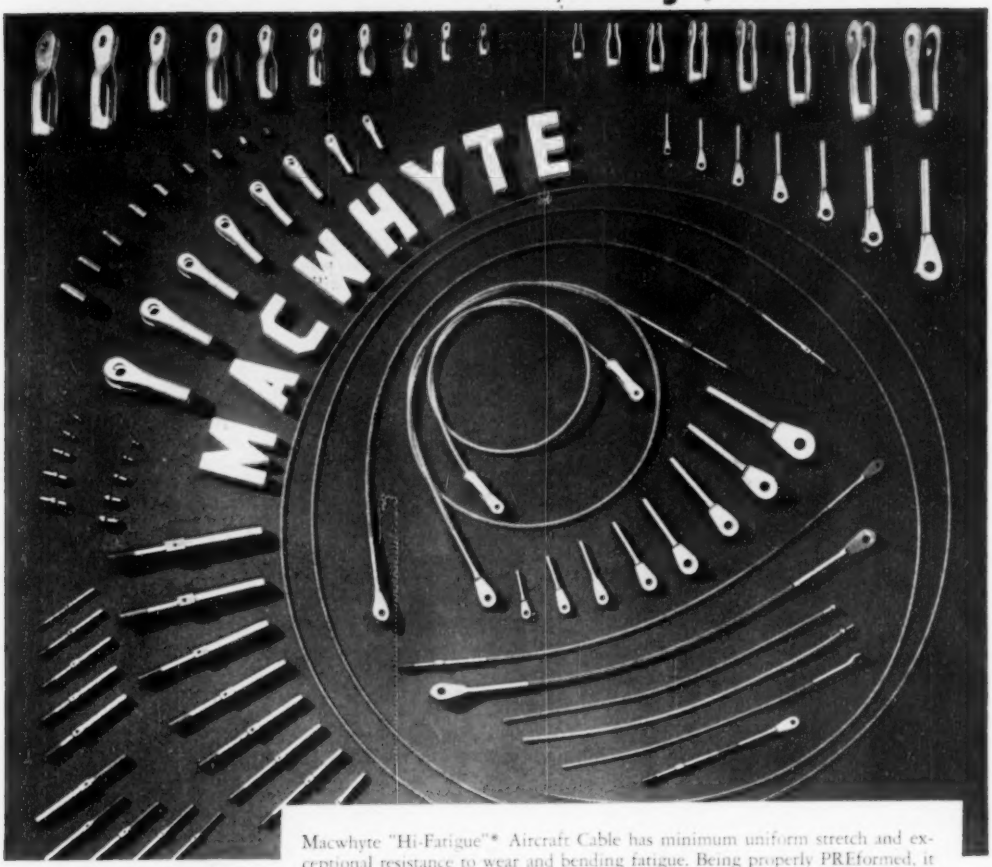
Rep. Harry Sheppard failed in an attempt to obtain funds to start construction on a new 60,000-ton flush-deck carrier of the Forrestal type. Rep. Edith Nourse Rogers stated: By mid-1953, Air Force is scheduled to have 143 overseas bases, but Navy has been given only one carrier to accommodate the fast heavy planes that will be coming off the production lines in a few years.

Rep. Carl Vinson, chairman of the House Armed Services Committee and formerly the aggressive advocate of building up air power, supported cuts in aircraft procurement and "postponement" of construction of a new flush-deck carriers.

–Katherine Johnsen

for maximum performance

MACWHYTE Aircraft Cable, Fittings, Assemblies



Macwhyte "Hi-Fatigue"* Aircraft Cable has minimum uniform stretch and exceptional resistance to wear and bending fatigue. Being properly PREformed, it lays dead with no tendency to twist or curl which provides better cable assemblies at lower cost.

You can order Macwhyte "Hi-Fatigue"* Aircraft Cable in reel lots, specified lengths, or assemblies. Macwhyte "Safe-Lock" and "Socket-type" terminals are supplied loose or attached to cable.

Macwhyte Aircraft Catalog A-2 is available on request.

MACWHYTE COMPANY

2905 Fourteenth Avenue, Kenosha, Wisconsin

Manufacturers of "Hi-Fatigue" Aircraft Cable • "Safe-Lock" Cable Terminals • Cable Assemblies • Tie Rods • Braided Wire Rope Slings • Bright, Galvanized, Stainless Steel and Monel Metal Wire Rope.

Member A.D.M.A. and A.I.A.

* "Hi-Fatigue" is a registered trademark

1218A

WHO'S WHERE

In the Front Office

Francis C. Jones, former administrator of Philippine Air Lines, has joined Transocean Air Lines as administrative assistant to the president, with office in Oakland, Calif. Jones retains a directorship in Andres Soriano's San Carlos Milling Co.

Neal J. Coleman has been appointed vice president-administration for Pacific Airmotive Corp., Burbank. He will supervise military affairs, contract administration, plant security and office services. Coleman joined PAC in 1950 as assistant to the president and contract administrator.

Changes

Raymond A. Rugge, formerly president and general manager of Kilgore Mfg. Co., Worthington, Ohio, has been designated chief engineer of Minneapolis-Honeywell's Aeronautical division.

Welcome W. Bender has been named chief electronics engineer for Glenn L. Martin Co., Baltimore.

George M. Russel has been named to the new post of flight safety engineer for Northrop Aircraft, Inc., Hawthorne, Calif.

Frank J. Larkins has been appointed materials control manager for Bridgeport-Lycoming division of Avco Mfg. Co., Stratford, Conn.

O. T. Kreusser has been designated assistant to the general manager of the Allison division of General Motors.

Gunther Vogt, formerly engineer with Civil Aeronautics Administration, has joined Engineering Research division of Midwest Research Institute, Kansas City, Mo.

C. H. Calhoun, formerly vice president of Mid-Continent Airlines, has joined National Airlines as system director of maintenance and engineering.

Henry G. Riegner has been named director of advertising for Trans World Airlines, will handle all TWA media advertising in the eastern hemisphere.

JAMES E. WEBB, (right) Undersecretary of State from 1949 to March 1952, former Budget Director of the U. S. and one-time vice president of the Sperry Corp., has been elected a director of McDonnell Aircraft Corp., St. Louis. Webb has considerable aviation background. With him is James S. McDonnell, Jr., MAC president.

INDUSTRY OBSERVER

► All fuel in Fairchild Engine and Airplane Company's new big-wing Packet is externally carried in pods. Pods used for prototype flight testing are those developed for B-47 external fuel tanks. Tanks on the big-wing are non-droppable. They were so designed after considerable evaluation of both droppable and non-droppable techniques.

► **Royal Dutch Air Force is experiencing some difficulty with supplies for its MDAP-NATO allotment of Republic F-84 tactical support fighters. Dutch sources reveal that there are few engine replacements available through MDAP and USAFE supply lines for F-84 engines, and components have been snarled for months. Result: Much of the Dutch Air Force F-84 equipment is not operational.**

► Navy calculates the new carrier Forrestal's four-catapult launching system will permit launching of as many as 32 jet interceptors in four minutes. All jets will be launched by catapult, despite longer deck of Forrestal.

► **Summary of major auto company building projects for aircraft production, released recently in Detroit, shows that five major new plant programs, at a total value of $163 million, are scheduled to start in the April-June quarter. Included: Ford Motor Co., $18 million J40 jet engine plant, Wayne, Mich.; General Motors Corp., $50 million, three J65 Sapphire engine and accessories plants at Flint; Nash-Kelvinator Corp., $12 million, aircraft components, Detroit; Packard Motor Car Co., $83 million J47 jet engine plant, Detroit.**

► Douglas Aircraft opposition to Air Force assignment of USAF Plant No. 8 at Orchard Place, Chicago, Ill., has resulted in AF agreement to reconsider. Navy, with Douglas backing, has also told Air Force it does not consider the wood structure an adequate site for production of the twin-engined carrier bomber A3D. Air Force had hoped Douglas would build the RB-66 (USAF version of the A3D) and the A3D on twin production lines there.

► **Program revisions by the Air Force in view of congressional proposals for cutting back USAF plane funds by $560 million—thus stretching out the stretchout of buildup to 143 wings by end 1955 to 1956—are threatening B-47 production. Reports are that Lockheed-Marietta and/or Douglas-Tulsa, both in tooling stages, may be pulled out of B-47 production.**

► Avro Canada, Ltd. expects to have "one or two" squadrons of CF-100 Canuck twin-jet night fighters in RCAF service by year-end, despite large-scale changes in armament requirements which have caused considerable revision of plans for the plane.

► **The Chicago World War II Douglas plant reportedly is being considered as a production center for the Northrop Snark guided missile, if the Douglas arrangement to build A3Ds and B-66s there doesn't go through.**

► The number of Hagerstown-manufactured and Willow Run-assembled Fairchild C-119s has been boosted from 10 in original contract agreements to 30. Original agreements to prime the Willow Run production flow included two C-119s in major assembly; two in subassembly and six in parts. Last summer Fairchild agreed to ship parts for four more aircraft and in February of this year negotiations were under way for 16 additional aircraft in order to prime the lagging Willow Run production lines.

► **Lockheed Aircraft Corp. plans to make its operations at Marietta, Ga., a permanent installation, according to Courtlandt S. Gross, vice president. Gross said the company is looking toward making the Georgia Division a permanent member of Lockheed Aircraft Corp. to build planes of its own design.**

AVIATION WEEK VOL. 56, NO. 16
APRIL 21, 1952

AMC Decentralizes Wright Field Buying

- **Complete airframes and engines stay at Dayton.**
- **But most contracts to be let at AF depots.**

By Byron C. Dempsey

Dayton, Ohio—A change in buying that may radically alter the relations between thousands of contractors and the Air Force is taking place at the Air Materiel Command.

AMC's huge buying machine, that now lets billions of dollars worth of contracts a year from Wright-Patterson Air Force Base, is being broken up. When the decentralization is completed, contracts will be let at 15 Air Force depots throughout the country, in addition to Wright-Patterson AFB.

WPAFB will continue to handle complete airframe and engine contracts. But contracts for spare parts for some airframes and engines and for most equipment will be shifted to Air Force depots. These latter constitute the preponderance of procurement awards.

The revision in purchasing procedures already has started. Since Apr. 1, Gentile Air Force Depot here has been buying Property Class 17-C (laboratory and shop test inspection equipment and maintenance parts).

But the move is by no means accomplished. And it is meeting stiff resistance on the part of some manufacturers' representatives who have established hard-earned, high reputations in Dayton on the basis of their expert knowledge of the present setup.

▶**Employes Balk**—Objections are coming, too, from some veteran employes at the field who have homes and families in Dayton and now would have to move elsewhere or seek new employment. Some members of Congress from Ohio have received petitions from AMC employes protesting the decentralization, and promise an investigation.

The program is being geared to individual property classes within similar production fields. Best example is the Wilkins AF Specialized Depot at Shelby, O., tentatively selected as the base for purchasing special clothing and personal equipment, Class 13; cordage, leather and fabrics, Class 21;

New Buyers' Atlas

Following is a partial list of proposed locations of buyers for some of the most important items now bought at Air Materiel Command headquarters, Wright-Patterson AFB, Ohio. Any change will not be effective until after July 1, 1952.

If You Sell . . .	Your Buyer Will Be at . . .
Airframe spares for Convair T-29; Douglas C-47, C-54, C-117, C-118, C-124; Lockheed C-121; Northrop C-125; North American B-25, B-45, L-17 (Sub-class 01)	Air Materiel Area Depot San Bernardino, Calif.
Airframe spares for Sikorsky and Fairchild aircraft (Sub-class 01)	Air Materiel Area Depot Middletown, Pa.
Aircraft Hardware (Class 04A)	832nd AF Specialized Depot Topeka, Kan.
Rubber Materials (Class 04B)	Wilkins AF Specialized Depot Shelby, Ohio
Anti-friction bearings and parts (Class 04D)	Mallory AF Specialized Depot Memphis, Tenn.
Aircraft instruments (Class 05)	Air Materiel Area Depot Middletown, Pa.
Fuels, lubricants and gases (Class 06A)	Oklahoma City, Okla.
Fuels, lubricants and gases (Class 06B)	832nd AF Specialized Depot Topeka, Kan.
Special clothing and personal equipment (Class 13)	Wilkins AF Specialized Depot Shelby, Ohio
Laboratory and shop test inspection equipment (Class 17C)	Gentile AF Specialized Depot Dayton, Ohio
Tailored paulins and covers (Class 20A)	Wilkins AF Specialized Depot Shelby, Ohio
Survival equipment and parachutes (Class 20B)	Air Materiel Area Depot Middletown, Pa.
Cordage, leather and fabrics (Classes 21A, 21B)	Wilkins AF Specialized Depot Shelby, Ohio
Metals and composition materials (Classes 23A, 23B)	832nd AF Specialized Depot Topeka, Kan.
Chemicals (Class 24)	832nd AF Specialized Depot Topeka, Kan.
Office equipment and supplies (Classes 25A, 25B)	Cheli AF Specialized Depot Maywood, Calif.
Hardware and miscellaneous supplies (Class 29)	832nd AF Specialized Depot Topeka, Kan.
Printing, reproduction and binding (Class 33A)	Wilkins AF Specialized Depot Shelby, Ohio
Musical instruments (Class 36)	Cheli AF Specialized Depot Maywood, Calif.
Athletic and recreation equipment (Class 37)	Cheli AF Specialized Depot Maywood, Calif.
Furniture and fixtures and furnishings (Classes 40A, 40B)	Cheli AF Specialized Depot Maywood, Calif.
Packaging materials (Class 43)	Gadsden AF Specialized Depot Gadsden, Ala.

tailored paulins and covers, Class 20; rubber materials, Class 04B, and printing, reproduction and binding supplies, Class 33A.

Again using Shelby as an example, AMC activities involved in the individual classes will be transferred from Dayton. First to go will be supply division requirements. Procurement will follow, although this phase is expected to remain at Wright-Patterson AFB until after the end of the 1952 fiscal year, June 30, in order not to delay the procurement "stretch drive."

▶**Depot Commanders**—The new arrangement makes the commanding officer of each specialized depot responsible for the complete acquisition of Air Force materiel under his jurisdiction. This depot commander will also be responsible for dealing with all other Air Force commanders and must consider the overall requirements of the Air Force in the performance of his functions. This commander will be allocated funds; he will determine requirements; place purchase requests and execute contracts; and upon receipt of the materiel he will distribute it among consumers in the Air Force.

Officials say AMC has been considering this decentralization plan for two years and that two years ago certain key functions of distribution were shifted from Wright-Patterson to the depots. The present program is declared to be the brainchild of Lt. Gen. Edwin W. Rawlings, AMC commanding general. His deputy, Maj. Gen. William H. Tunner, has worked out the details of the entire program.

▶**Follows Industry**—Gen. Tunner headed a committee composed of depot and procurement district commanders, as well as representatives of giant corporations. The latter group offered advice based on experiences of decentralizing by big industry, and the present plan is the fruit of many months of study and planning.

As one AMC officer says, "The world's largest procurement and distribution machine is following in the footsteps of big industry."

The decision to decentralize activities had its roots in the acute lack of housing in the Dayton area, overcrowding of more than 30,000 employes at Wright-Patterson AFB and traffic conditions in transportation of workers. Clogged highways continue despite staggering of shifts on three half-hour intervals to alleviate intolerable conditions formerly prevailing on the two-shift basis.

AMC officials have presented charts before civic leaders, including the Dayton Chamber of Commerce, which indicate that the maintenance-supply-procurement function can be handled more economically and rapidly on a decentralized basis. The Air Force, however, will pay transportation expenses to depots for employes, their families and furnishings.

AMC officials announced that approximately 2,000 employes will be affected in a series of transfers of functions between now and the end of the calendar year. Questionnaires already have been sent to those units destined to be centered in the depots and employes were given 15 days in which to indicate that they either did or did not desire to transfer to another locality.

▶**Little Opposition**—Officials said surprisingly little opposition was noted in questionnaires returned thus far—considering that the shifts involve many career employes with deep domestic ties in the Dayton vicinity. Chief opposition is reported to be among Negro employes who object to transfer to "Jim Crow" areas. Two of the latter are Gadsden, Ala., where packaging materials will be handled, and Memphis, Tenn., where anti-friction bearings and parts will be procured.

Employes previously were informed that in event they decline transfers to depots they will be given 60 days to "shop around" Wright-Patterson for another position with comparable salary. If they do not find such a position within the allotted time, separation is automatic under Civil Service regulations.

Engineering liaison personnel will be assigned to the various depots to provide links with Wright Air Development Center laboratories which will remain at Wright-Patterson AFB. AMC officials will admit privately that this separation of functions from project officers may provide the biggest headache in the overall plan—as well as arousing the ire of manufacturers who face the problem of doing business with a project officer in Dayton and a procurement officer who could be located as far away as the West Coast.

▶**Tried During War**—The latter condition is the basis for numerous predictions that the system will not be practical in operation and actually will be of greater overall expense than under the present arrangement where all but local purchase is concentrated at Wright-Patterson AFB which also houses project officers.

The same opponents to decentralization point out that the Air Force tried to "farm out" the buying of certain aircraft tools during World War II. After a test, buying was returned to Dayton.

Among the most important Air Force depots, under present plans, will be those at Middletown, Pa., and San Bernardino, Calif. The first will buy aircraft instruments, certain engine and accessory spare parts and spares for Sikorsky and Fairchild aircraft. The second will be in charge of purchasing spare parts for aircraft produced by Convair, Douglas, Lockheed, Northrop and North American.

In addition to the decentralization of buying, the consolidation of six field procurement district offices with seven Air Materiel Area headquarters is a distinct future possibility, AMC officials indicate.

FIRST FLIGHT OF NEW PIASECKI YH-21

Piasecki Helicopter Corp.'s new YH-21 rescue copter for USAF is seen hovering over Philadelphia Airport, Pa., during its first flight Apr. 11. Seating 16, including crew of two, the YH-21 is a development of the earlier all-metal HRP-2 Flying Banana adopted by USMC for assault helicopter training. The new tandem rotorcraft is powered by a Wright R1820-103 rated at 1,150 hp., has a speed of 125 mph. and ceiling of over 16,000 ft. Operating gross overload weight is over 14,000 lb. Cabin measures 20 ft. long by 5 ft. 6 in. by 5 ft. 6 in., totaling 615 cu. ft. Fuselage length is 52 ft. 6 in., height is 16 ft. The rotors are 44 ft. in diameter. A hydraulic hoist is fitted for lifting personnel or up to 400 lb. of cargo while the YH-21 hovers. Fully winterized for Arctic operation, the new Piasecki is in quantity production for USAF Rescue Service at the company's Morton, Pa., plant.

Power Failure Blamed in Crash

PanAm pilot says two engines quit; crash at sea kills 52 in fifth U.S. carrier accident this year.

Passenger panic apparently caused the deaths of 52 passengers aboard a Pan American DC-4 that sank three minutes after a water landing off San Juan this month. That's the preliminary report from Puerto Rico by field investigators for the Civil Aeronautics Board.

Most of the passengers were Puerto Ricans outward bound on PanAm's non-stop San Juan-New York aircoach. Of the 69 aboard, only the crew of five and 12 passengers escaped.

▶ **Blames Power Failure**—Pilot John C. Burn said he was forced to ditch the plane because the two right engines were out. He was able to maintain directional stability, but he couldn't hold his altitude. He turned back toward San Juan when the No. 3 engine cut out. He feathered that engine, but shortly thereafter the No. 4 engine's power diminished almost to zero.

It was the fifth fatal crash involving U. S. carriers so far in 1952 and the fourth in scheduled service. The toll this year stands at 130 passengers killed.

Three fatal crashes occurred in the New York metropolitan area; all were scheduled operations. The other 1952 crash was a Pacific Airlift Northwest Airlines charter operation off Alaska.

▶ **Safety Suggestions**—Meanwhile Air Line Pilots Assn. and the Airport Advisory Committee, the Airport Operators Council and the American Assn. of Airport Executives have come up with some recommendations for the President's Airport Commission on improved airport safety.

Highlights of the pilots' plan:

- Exclusive regulation of interstate air traffic by the federal government.
- Federal intervention in zoning regulations around airports.
- Specialization of airports for each type of aircraft—such as lightplanes, short-haul transports, longhaul transports and military.
- Air safety importance stressed before noise nuisance.
- More military-civil coordination on development and installation of air safety equipment and use of specialized personnel.
- Airports be kept close to the cities they serve.

▶ **Operators' Plan**—The airport operators proposed proper zoning (with 75% of cost for any additional land purchases to be paid by the federal government); use of preferential runways to keep aircraft away from built-up areas; installation of additional radio, radar and lighting aids; establishment of maximum noise level for aircraft.

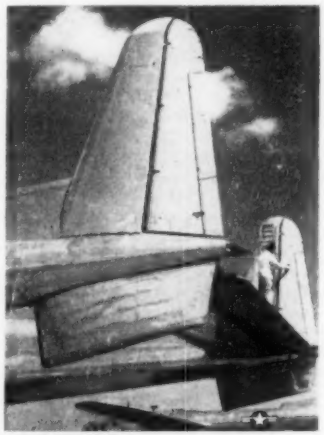
The resolution said it is impractical to relocate civil airports or to make any major changes in airport configuration as a safety measure or to reduce noise.

▶ **CAB Ideas**—And Civil Aeronautics Board has come up with some safety recommendations of its own. Buried in its accident investigation report this month on the Miami Airline C-46 crash of Dec. 16 at Elizabeth, N. J., are broad hints that CAA and CAB should tighten up the Civil Air Regulations.

The direct cause of this crash, according to the CAB report, was a stall after serious loss of power in one engine due to a fire. The fire and loss of power were traced to failure of the hold-down studs of the No. 10 cylinder.

But the CAB report alleges that the nonscheduled airline's pilot training in emergency procedure was spotty. The pilot of this plane apparently did not carry out all the required emergency moves, CAB says. Such procedures include shutting off the fuel, oil and hydraulic systems to the burning engine. Also, the Board says this line employed combination pilot-mechanics.

"Although this is not a violation of the Civil Air Regulations, it is not considered good and accepted practice. . . ." Finally, the Board notes that the line had allegedly violated the Civil Air Regulations 16 times, of which 14 were overloading of the aircraft. In this crash, CAB says, the plane took off with an overload of 117 lb.



MODIFIED Packet sports ventral fin.

Fairchild Modifies Navy R4Q Packet

A modified Fairchild Navy R4Q Packet has completed a 19-flight structural testing program flown from Naval Air Test Center, Patuxent, Md. Tests were described by the manufacturer as more rugged than any presently known requirements for cargo-type aircraft.

Packet modifications include addition of ventral fins to the vertical tail surfaces and changing the spring tab of the rudder control system. The ship was instrumented, modified, flight-tested and ready for demonstration in less than 12 days.

Flight tests included:

- **Abrupt rudder kick:** 344-lb. rudder pedal force applied in three-tenths of a second at an airspeed of 222 mph.
- **Highspeed sideslip:** 300-lb. rudder pedal pressure applied at 261 mph.
- **Rolling pullout** with maximum aileron force demonstrated at a speed of 248 mph.
- **Fully loaded maneuverability:** in a dive the R4Q was subjected to 3¾ G—more than three times its own weight, or 246,000 lb.

Navy pilots paced the R4Q in carrier-type aircraft to witness the maneuvers.

YB-52 Makes First Flight at Seattle

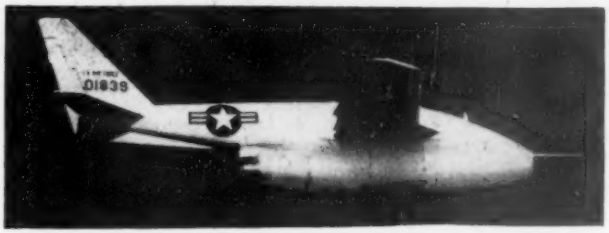
The Air Force's eight-jet YB-52 Stratofortress bomber last week made its first flight of 2 hr. 51 min., taking off from Boeing Field, Seattle, and landing at Larson AFB, Moses Lake, Wash. Although the air base is only 180 airline miles away, Boeing Test Pilot A. M. (Tex) Johnson did "a lot of circling around," in the test hop.

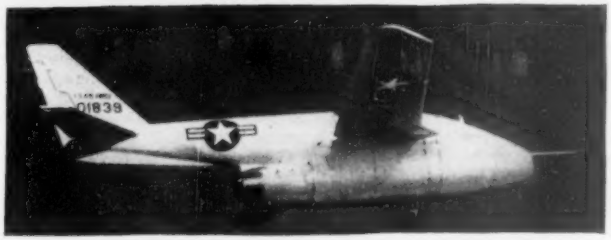
Except for one takeoff picture scheduled to be released last week, the bomber is to continue under security wraps during the additional ground testing which is planned at Larson AFB.

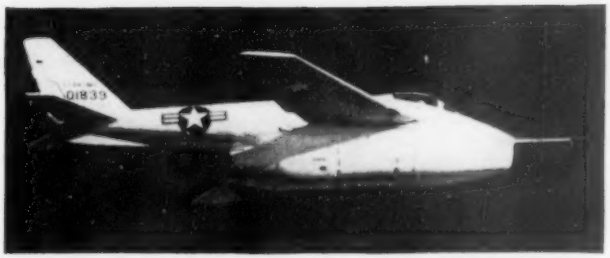
Observers at Boeing Field said the plane took advantage of the long 10,000-ft. runway to make a very gradual takeoff. Flaps and wheels still were down when the plane disappeared from view leaving smoke trails from its eight Pratt & Whitney J57 engines.

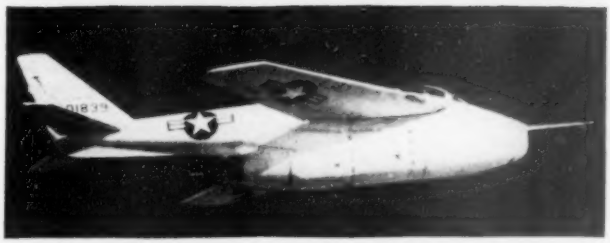
The YB-52 is the second Stratofortresses to be completed. It was rolled out Mar. 15. The first Stratofortress, the XB-52, completed its taxi tests earlier but was returned to the factory for installation of equipment not available at the time of its rollout in January. It is expected to be ready for flight soon.

Get in the Scrap
Put Your Steel to Work









X-5 SHOWS HOW IT DOES IT

This dramatic photo sequence depicts Bell X-5 research plane varying its wing sweep in flight, while at same time the wings move forward along the fuselage to compensate for shifts in center of gravity and center of pressure. The change from fully straight to fully swept takes but 30 sec. The little (about 10,000-lb.) single-seater is powered by a 4,900-lb.-thrust Allison J35-A-17A turbojet. Data obtained from these tests will be used in design of future combat planes using variable sweep.

S-55 Cracks Up

- **LAA loses big new copter when tail rotor fails.**
- **Carrier asks higher mail rate to offset loss.**

Faced with a major factory rebuild of its big Sikorsky S-55 12-place transport helicopter after a crackup at Los Angeles International Airport, Los Angeles Airways last week asked CAB for higher mail rates.

The carrier cited the accident Apr. 9 as the culmination of a series of events which it said made the current rate insufficient for its continued operations.

The accident occurred shortly after a demonstration flight in which Los Angeles civic officials had participated, celebrating the copter's delivery to the operator.

▶**Reports Vary**—Pilot Fred Milam, LAA operations manager, had taken off from the passenger terminal side of the airport to hop across to the LAA hangar on the opposite side. Reports of the altitude reached varied from 400 ft., as reported in a Los Angeles paper, down to 60-70 ft., as estimated by one control tower operator.

The tower reported the anti-torque tail rotor was seen to stop rotating and the fuselage started turning under torque of the main rotor. Milam's skill in manipulating throttle and main rotor controls is credited by some observers with bringing the craft down without a complete washout.

Three passengers, Stanley Brown, LAA maintenance supervisor, M. T. Tucker, airport engineer, and Tom Dannenbrink, airport accountant, were reported hospitalized with injuries. Milam and John Kane, LAA secretary, were not seriously injured.

▶**Cause Localized**—Cause of the accident was found in the tail rotor drive assembly, investigators said. The tail rotor stopped when power was lost. A Sikorsky spokesman said a spring lock in one of the couplings in the tail rotor drive shaft became dislodged. Sikorsky engineers already have come up with a fix for the assembly designed to eliminate such accidents.

Damage to the machine will require a factory rework, if it is reparable at all, LAA said. The frame was reported sprung, with extensive damage to rotor and landing gear, in addition to the damaged tail rotor boom and assembly.

CAB had fixed a rate of $1.30 per airplane mile, for mileage up to but not exceeding 30,000 mi. in any cal-

endar month, with 60 cents an airplane mile for mileage over 30,000 in any month. LAA had expected the S-55 Jan 1, but delays caused by military requirements and certification postponed delivery until more than three months later.

▶**Asks Rate Hike**—Since it will be some time before LAA can get the damaged S-55 repaired or get delivery on a second one that is on order, it is asking CAB to fix a temporary higher rate to cover higher operating costs.

The LAA S-55 is the 116th of its basic type to be delivered by Sikorsky, the others going to military services. It had been ferried across the continent before the accident.

It is expected that the second S-55 ordered by LAA will be ready for delivery in May, before the first machine can be repaired and returned.

Steel Formula Won't Upset Aircraft Wages

The 17½-cent hourly wage increase recommended by Wage Stabilization Board for the steel industry won't be reflected in higher union demands in aircraft right away.

Many aircraft companies already have made settlements covering all or part of the increase suggested for steel workers. Some, like Glenn L. Martin, Fairchild and McDonnell, also have signed escalator contracts under which wages are adjusted quarterly on the basis of the government's cost-of-living index.

▶**C-W Settled**—Wright Aeronautical division of Curtiss-Wright Corp, has settled for a 14-cent-plus wage increase recommended by WSB. The Board also recommended an increase of about 25 cents an hour—covering more than two years—at Douglas Long Beach plant.

Ryan Aeronautical's wage dispute with UAW-CIO has been submitted to WSB.

Boeing has settled its dispute at Wichita with the International Association of Machinists, AFL. This dispute was referred to WSB by the White House, but the WSB panel made a suggestion which Boeing and the union used as a basis for settlement.

Aircraft contracts filed with the Bureau of Labor Statistics disclose that most aircraft wage negotiations will come up in the fall. Likely dates:

- Boeing (Seattle)—contract expiration in June.
- North American—wage reopening after Apr. 23.
- Consolidated Vultee—contract expiration in August.
- Douglas (El Segundo and Santa Monica)—IAM contract negotiations in August.
- Lockheed—negotiations in August.

Safety Decision Reversed by CAB

CAA unit had decided automatic feathering was not a consideration in one-engine-out performance.

(Editor's note: This is the second of a series of articles analyzing CAA's Office of Aviation Safety, its policies and key personnel.)

By Alexander McSurely

Explanation for some of the growing criticism of the CAA's Office of Aviation Safety within the aircraft industry is found in the recent case history of a technical decision on transport propellor feathering made by that office and later overridden by Civil Aeronautics Board.

To understand why such a decision was made in the first place, it helps if you realize that the CAA Office of Aviation Safety has no top men who are qualified to make technical decisions on aviation safety. Its few competent engineers are outranked by the "old guard" of non-technical personnel.

Unless this long-standing situation is changed and a clear line of authority for engineering decisions is established, direct to Administrator Charles Horne, the industry may anticipate similar decisions in the future.

▶**CAB Ruled**—The final knockout blow on this decision came from CAB in its Interpretation No. 1 to Civil Air Regulations Part 4B adopted Mar. 7.

But the decision and the industry argument that went with it, goes back months before. Basically the question amounted to whether CAA meant what it said when it approved the automatic feathering device for transport aircraft as an important factor in aircraft performance.

▶**Control Speed**—Actually CAA's Office of Aviation Safety had decided that the automatic feathering device for propellers was not to be considered in determining minimum control speed requirements for transport planes in a condition of one engine inoperative. It was insisting that the inoperative engine be considered in a propeller windmilling condition whether its propeller could be automatically feathered or not.

Because of the importance of this decision on the whole engineering philosophy of acceptance of the automatic propeller feathering device, and the higher performance with one engine out that it makes possible, aircraft industry representatives opposed CAA's position.

▶**Unqualified Acceptance**—The industry representatives argued that if the Administrator accepts an automatic feathering device on an airplane, he accepts it as a factor in determining one-engine-out performance.

CAA called its Director of Technical Services in the Office of Aviation Safety, George Haldeman, a pilot but without engineering training, back from Montreal at one time to participate in the discusisons. But the question wasn't settled until CAB stepped in and decided it.

Here is what the Board said in its interpretation:

Civil Air Regulations Part 4B
Interpretation No. 1
Adopted: March 7, 1952
Airplane Airworthiness—
Transport Categories

"The Board has been asked for an interpretation of SS. 4B. 133 (A) (8) of the Civil Air Regulations, as added by amendment 4B-6 dated January 28, 1952. This provision became effective on March 5, 1952, and reads as follows:

'(8) The propeller of the inoperative engine windmilling, except that a different position of the propeller shall be acceptable if the

Safety Meeting

Under fire from Capitol Hill and the press, the chief of CAA's Office of Aviation Safety has called a conference of all his safety division chiefs to be held in Kansas City Apr. 28-29.

"I feel that such a conference is highly desirable," E. S. Hensley, OAS director, said in his memo calling the meeting.

"I do not plan to follow any formal agenda, nor do I wish to discuss detail operational problems. Rather, our discussions should be aimed at a complete understanding of our job, our responsibilities, our duties, and our relationships, one with another.

"I should also like to discuss our objectives, our methods of operation, and our means of evaluating and accounting for our performance and accomplishments.

"If you have any special interest items or areas of our operation that you particularly wish to have discussed, send them to me beforehand so that preparation may be made prior to the conference."

specific design of the propeller control makes it more logical to assume the different position.'

"The question presented is whether the Administrator, in certificating new types of transport category airplanes after the effective date of this provision, will be required to accept a value for the one-engine-inoperative minimum control speed provided for by SS. 4B 133 which has been established with the propeller of the inoperative engine feathered where the airplane involved has an approved automatic propeller feathering system, or whether he may require such value to be established with such propeller windmilling irrespective of the automatic feathering system.

"The Board, having considered the language of the provision above set forth, the history which preceded its adoption, particularly the comments submitted thereon, and the purpose and intent of its sponsors, hereby issues the following interpretation which, in accordance with SS. 3 (A) of the Administrative Procedure Act, will be published in the Federal Register and will be incorporated in Part 4B of the Civil Air Regulations:

Minimum Control Speed

"(1) The Board interprets and construes Subparagraph (8) of SS 3B 133 (A) as requiring the Administrator to accept for the purposes of SS. 4B. 133 A value for the one-engine-inoperative minimum control-speed which has been established in accordance with the provisions of that section with the propeller of the inoperative engine feathered, provided that the airplane involved is equipped with an automatic feathering device acceptable to the Administrator under SS. 4B. 10 for demonstrating compliance with the take-off path and climb requirement of SS. 4B. 116 and 4B. 120 (A) and (B).

"(Sec. 205 (A), 52 Stat. 984; 49 U. S. C. 425 (A). Interpret or apply Secs. 601, 603, 542 Stat. 1007, 1009; 49 U. S. C. 551, 553; 62 Stat. 1216)."

The interpretation was signed by M. C. Mulligan, Secretary of CAB.

AF Captain Charged With Irregularities

Filing of three charges in a court martial action against a former Air Materiel Command contracting officer was the highlight of three separate actions in recent developments on alleged Air Force procurement irregularities.

Capt. Jerry Mitchell, Jr., 31, Dayton, will face a military tribunal at a future date on charges of gross negligence, recklessness in performance of duty and accepting gratuities.

Rated a senior pilot, Capt. Mitchell is alleged to have committed the offenses from May, 1950, to June, 1951. Extent of the gratuities was not announced.

▶ **Others**—Meanwhile, Robert G. Hollifield, Sr., was arraigned in Federal District Court here where he entered a plea of innocent to charges of bribery and conspiracy. Trial was set for May 7.

Hollifield, former unit chief and project officer in the Aero Medical Laboratory of Wright Air Development Center, was indicted jointly with William J. Opper, Chicago jobber, on three counts of bribery and one of conspiracy. Indictments grew out of procurement of sun glasses and ski goggles in which overt acts charged to the two included $1,600 in gratuities.

Indictments charge that the money was given to Hollifield in a series of payments from March, 1950, until August, 1951, and was instrumental in Opper receiving six contracts. Opper was scheduled to be arraigned in the Federal District Court at Cincinnati.

Third development is an action pending against an Air Force lieutenant colonel who is alleged by the Air Force in Washington to have been engaged in procurement irregularities while a civilian contracting officer prior to his recall to active duty.

SUPER CONNIE tests tiptank installation slated for Lockheed turboprop R7V-2.

Tiptanks to Increase R7V-2 Range

The now familiar wingtip fuel tank has been adapted as a range stretcher for large transports by Lockheed Aircraft Corp. Big 600-gal. tiptanks are now being flight-tested on the prototype Super Connie before installation on two Navy R7V-2s. The R7V-2 Super Connies will be powered by P&W T34 turboprops rated at more than 5,000 hp. each.

Lockheed's chief research engineer, Clarence L. (Kelly) Johnson, cites several reasons for the tiptank installation:

- Turboprop fuel consumption may run as much as 50% over piston-engine consumption.
- Tanks provide improved stability through "end plate action," keeping wind from sliding off wing end.
- Tank weight tends to damp out flight vibrations, making for smoother ride.
- Tank in flight develops enough lift to more than compensate for its loaded weight of 3,900 lb., so no payload or range need be sacrificed, according to Lockheed.

Lockheed will also fit pod-type tanks under the wings of the R7V-2. Says designer Johnson: "Airplanes of the future are going to develop a lot of protuberances."

The turboprop Super Connie will require 8,770 gal. of fuel, compared with the 6,570-gal. capacity of the Wright Turbo-Compound piston-engine versions. The company sees the external tanks making possible long-distance nonstop hops from Shannon, Ireland, to New York at cruising speeds of 440 mph. or more.

LAS to Open Big Jet Base

By mid-September, Lockheed Aircraft Service, Inc., will have in operation a big new modification and overhaul base for jet aircraft at Ontario, International Airport, Ontario, Calif.

The installation will comprise a 40,000-sq. ft. hangar with two attached shops, other adjoining shops and warehouse facilities totaling about 18,000 sq. ft., and miscellaneous buildings of approximately 5,000 sq. ft. in area.

Lockheed will use a flight line in a three-acre plot at the north end of the field. The company expects to have approximately 500 employes working at its new facility.

Narco's Low-Cost Omni

An improved course selector for better pin-pointing of omnirange headings has been incorporated in a low-cost VHF omni set for small planes developed by National Aeronautical Radio Corp., Ambler, Pa. The new Superhomer weighs 10 lb. and sells for less than $500.

McDONNELL F2H-2 Banshee comes in for landing on USS Essex carrier, its arresting hook lowered.

Future Navy Air Role Shaped in Korea

Day-in-day-out operation of Banshees off carriers prove worth of that plane and value of sea-borne jet types.

By A. W. Jessup

(*McGraw-Hill World News*)

Carrier Task Force 77—The roughcast of future naval air power employment finally is taking shape here off the coast of Korea.

The recent combat service tour of Carrier Air Group Five (CAG 5) aboard the USS Essex with this task force provides for the first time data upon which to evaluate the U. S. Navy's arguments for the development of strong naval air striking forces.

CAG 5 conducted the first real combat attack tests of carrier-based jet aircraft. The results prove the feasibility of continuous, concentrated jet operations from late model carriers, reveal many advantages for jets over conventional piston-powered aircraft and should sweep away a majority of the previous prejudices against the more modern jets.

Until last August, when the Essex arrived with this air group, Grumman F9F-2 Panthers aboard carriers in Korean waters were used. But they flew defensive and reconnaissance missions almost exclusively and were considered a great nuisance, hardly worth their weight.

▶ **Good Case, Bad Example**—Navy publicists and commanders went to great lengths trying to prove their case for fast carrier task forces based on the performance of Douglas AD Skyraiders and Chance-Vought F4U Corsairs. In some ways, it wasn't a bad case. Skyraiders could and did tote heavy bomb-loads (6,000-lb.) off carrier decks, were without doubt the best propeller-driven dive bombers extant and had endurance for "tooling" around over the target areas.

But these arguments wallowed away from two major and related propositions.

First, the Navy had ignored the special and favorable conditions of Korea. Carriers had almost complete freedom to roam the Sea of Japan, unmolested by enemy surface or air attack.

Furthermore, both the relatively slow flying Skyraiders and Corsairs operated in areas free from enemy air attack and, for a long time, free from anti-aircraft

TWO-PLANE Banshee element over Korean coastline heads back to USS Essex.

STANDARD EQUIPMENT

This electrically operated gate valve is a typical example of the advanced engineering, research and manufacturing the aviation industry has gained from Hydro-Aire's wide experience. Today, this product, like other Hydro-Aire equipment—Hytrol Anti-Skid Braking Systems, Valves, Filters, Actuators, Hydraulic, Pneumatic and Electrical Accessories—has become Standard Equipment on America's leading airplanes.

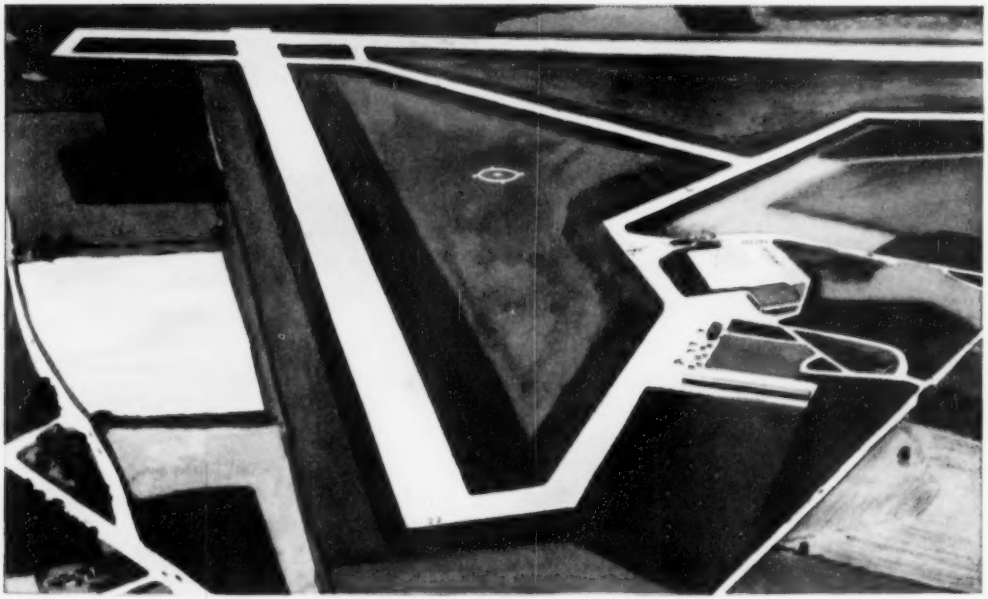
HYDRO-AIRE

HYDRO-AIRE Inc.

BURBANK • CALIFORNIA

A subsidiary of Crane Co.

EVERY FIGHTER, EVERY BOMBER, EVERY TRANSPORT IS HYDRO-AIRE EQUIPPED



"EXECUTIVE STOP" *for Washington D.C.*

Easton Municipal Airport Offers Complete Facilities for the Executive Aircraft Operator Who Travels to Washington, D. C.

STOP AT THE EASTON MUNICIPAL AIRPORT IN MARYLAND

. . . Put down on either one of the two 4000 ft. paved runways. Receive complete Cities Service Aircraft Servicing . . . the finest in the world. Enjoy a leisurely ride into Easton in comfortable Cities Service station wagons. Spend a restful and enjoyable evening in the Tidewater Inn, Easton's ultra-modern, ninety-five room hotel. Arise refreshed the next morning and make your twenty minute hop into Washington.

Easton's 500-acre Municipal Airport is the perfect answer for the busy flying executive who does business in Washington, D. C. Why not stop over next time you're near by?

Easton—A Regular Stop for All American Airlines . . . All American's big DC 3 planes land and take off from Easton's long 4000 ft. runways daily.

Private Plane Operators . . . find Easton the perfect stopover when en route to Washington, D.C.

Complete Servicing Facilities . . . Complete Cities Service aircraft maintenance . . . speedy, efficient. Hangar space easily available.

CITIES SERVICE

AVIATION PRODUCTS

New York · Chicago · In the South: Arkansas Fuel Oil Co.

artillery. Almost any bomb-carrier could have been used in Korea.

Perhaps, there will be other Koreas. Possibly, naval air power again can be used as it has been used in Korea.

The Navy, however, defends its demand for greater emphasis on naval air power development and procurement on the mobility of "fast carrier task forces" which can hit an enemy with surprise attacks from one direction, swing around for a surprise attack at another point from another unexpected direction.

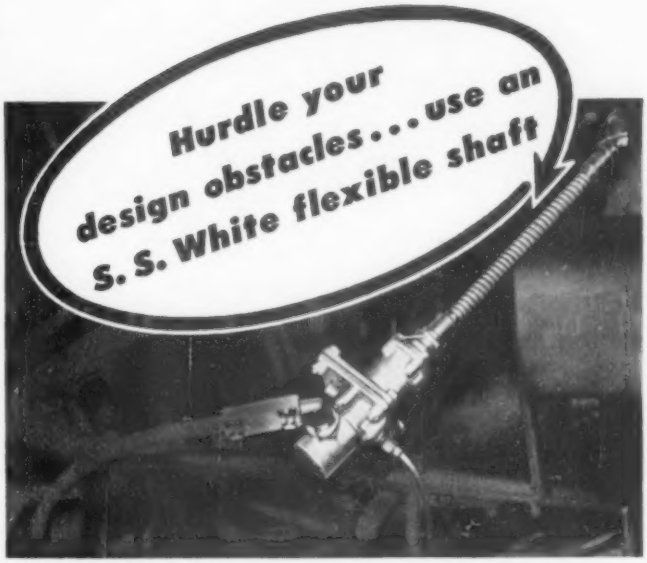
If its case is valid, Navy must be prepared to carry out such attacks against the toughest and best opposition which the biggest potential enemy can muster, not just against the limited opposition of other Koreas.

▶ **Jaundice on Jets**—The other fault in Navy reasoning resulted from unwillingness to look at the potentialities of jet aircraft, or from blindness. Throughout the first year of the Korean war, Navy officers, including admiral ranks, insisted to this correspondent that jets were inadequate for attacking ground targets, were poor dive bombers, were so fast pilots couldn't see anything on the ground, lacked endurance. Many of the statements came from men who had not been on the ground or in the air over Korea or had not observed jets in action.

One limitation on Navy jet utilization through the first year of the war was equipment. Carriers in service here had only light catapults which could not safely launch Panthers with respectable bomb loads. With only four 5-in. rockets, the Panthers dipped sharply over the bow on takeoff shots.

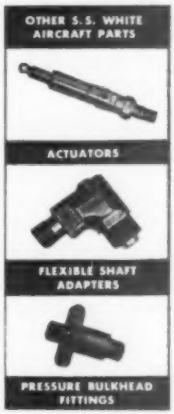
The Essex was the first and, so far, only carrier assigned to Korean action which was equipped with the heavy catapults for launching jets. Squadron VF-172 was the first and, so far, only McDonnell F2H-2 Banshee outfit assigned to Korean action. This correspondent hasn't yet found out why it took 14 months for the Navy high command to send a proper jet carrier team out here for testing and experimentation. A lot of people, including Navy

WINGS FOLDED, F2H-2 squats on deck.



PROBLEM: Provide a vibration-free drive for an aircraft fuel pump which permits the pump to be mounted at a distance from the power source, where it will be readily accessible and away from engine heat.

SOLUTION: An S.S.White flexible shaft, of course.



S.S.White Flexible Shafts are helping aircraft designers out of tight spots and around tough corners. The limitless adaptability of these "Metal Muscles"® for power drive and remote control makes them especially suitable for aircraft service and operating conditions. In their protective flexible casings, flexible shafts can be run from one point to another, around turns, along walls or under flooring almost as freely as electric wiring. They are immune to temperature variations, virtually invulnerable to damage. Here, in S.S.White "Metal Muscles",® you'll find the answer to many aircraft remote control and power drive problems.

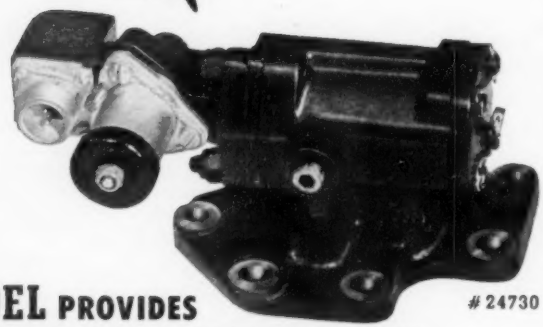
SEND FOR THIS 256-PAGE FLEXIBLE SHAFT HANDBOOK

It contains comprehensive facts and data on flexible shafts and tells how to select and apply them. Copy sent free if you write for it on your business letterhead.

THE S.S.White INDUSTRIAL DIVISION
DENTAL MFG. CO.
Dept. V, 10 East 40th St.
NEW YORK 16, N. Y.

Western District Office • Times Building, Long Beach, California

For Dependable
Supercharger Control
on Pratt & Whitney
R-2800 Engines...



24730

ADEL PROVIDES
BLOWER CLUTCH SELECTOR VALVE

For 2-speed supercharger control ADEL has designed and manufactured a solenoid operated selector valve. The two speeds are dependably selected by this valve which has only two positions and provides failsafe operation in case of electrical failure. Some of the other advantages of this latest example of ADEL'S ingenuity of design and precision manufacturing are:

- ELIMINATES ELECTRICAL ACTUATOR, MECHANICAL LINKAGES AND ADJUSTMENTS
- POWER OPERATED BY ENGINE OIL PRESSURE TO HIGH BLOWER POSITION
- SPRING LOADED TO FAILSAFE LOW BLOWER POSITION
- LIGHTER—LESS COMPLICATED
- LESS COST
- SIMPLIFIES INSTALLATION, SERVICING AND MAINTENANCE

For complete engineering specifications and counsel
Address: ADEL DIVISION, GENERAL METALS CORPORATION
10775 Van Owen Street
Burbank, California

ADEL LEADER IN HYDRAULICS
Manufacturers of Aircraft Hydraulic Control Equipment

DIVISION OF GENERAL METALS CORPORATION • BURBANK, CALIF. • HUNTINGTON, W. VA.

CANADIAN REP.: RAILWAY & POWER ENGINEERING CORPORATION, LIMITED

men on the spot, would like to know.

► **Banshee Endurance**—Besides Banshees, CAG 5 included one squadron each of F9F-2 Panthers, F4U-4B Corsairs and AD-4 Skyraiders, and an assortment of photographic and radar aircraft. This was an unusually large number of aircraft types, and limited full development of the Banshee capabilities. Banshee endurance is not quite equal to that of the prop planes, but is considerably longer than the Panthers' one and one-half hours, on which the Banshees were scheduled.

It is hoped that the next Banshee operation will be on an all-jet carrier or teamed up with Skyraiders only. This would reveal the full daily operational capabilities of the Banshees.

The Close View

Here is how the jets stacked up on this cruise of the Essex and CAG 5:

• **Bomb load.** Censorship prevents detail disclosure of the bomb load, but I have seen it launched carrying 1,500 lb. of bombs. The Panthers haul a smaller lethal load: two 500-lb. or four 250-lb. bombs plus two HVAR rockets or two 100-lb. bombs.

If the Banshee were equipped with adequate bomb racks, they could easily get off with close to 3,000-lb. The F2H-3 is expected to lift over 3,000-lb. It is startling to watch the heavy jets climb straight off the catapults of the Essex. With full load, the Banshee goes right into a steady climb the split second it is released. For a while it had been dropping at the end of the catapult shot, but it was found that with an immediate 15-deg. change of attack attitude it will climb right off.

• **Speed.** Banshee pilots say there isn't a Communist target anywhere in Korea that they couldn't hit within 25-min. after launching from 80 mi. off the Korean east coast. Working the eastern half of Korea now assigned to this task force in the interdiction program, the Banshees took 20 min. from takeoff through rendezvous to reach the targets and 20 min. for return to the carriers, leaving 50 min. of their one and one-half hour mission for working the Commies over.

This is considered ample but could be increased by putting the Banshees on a schedule of two to two and one-half hours. It's normal for the jets to report their "feet dry" (over the beach) about the time the last prop plane is launched, and their "feet wet" (back over the water on the return) at the time the props report their "feet dry." Properly scheduled, the jet men believe they could fly two sorties to every one for the props.

• **Accuracy.** Detailed study of the records should reveal a greater accuracy

The quality of Eaton Jet Engine Blades

is assured by newly developed Eaton production processes

As a supplier to aircraft engine manufacturers for many years, Eaton is thoroughly familiar with the problems involved in producing parts to meet the exacting requirements of the industry. We are also accustomed to the developing of specialized production machinery and processes when this is necessary to meet quality standards and hold costs to a minimum. In our jet blade plant, greatly expanded facilities include exclusive Eaton developments in metallurgy, fabrication, and testing—all combining to produce blades of highest accuracy under strict metallurgical control.

You can utilize Eaton's long experience in this field by giving our engineers an opportunity to work with yours in the early stages of design.

EATON MANUFACTURING COMPANY

CLEVELAND, OHIO

VALVE DIVISION: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN

PRODUCTS: Sodium Cooled, Poppet, and Free Valves * Tappets * Hydraulic Valve Lifters * Valve Seat Inserts * Jet Engine Parts * Rotor Pumps * Motor Truck Axles * Permanent Mold Gray Iron Castings * Heater-Defroster Units * Snap Rings Springtites * Spring Washers * Cold Drawn Steel * Stampings * Leaf and Coil Springs * Dynamatic Drives, Brakes, Dynamometers

to meet rigid aircraft requirements!
...check
EMC and CYCLOHM
FRACTIONAL H.P. MOTORS
Universal and Direct Current
1/1000 to 1/2 h.p.
Shaded Pole
1/2000 to 1/15 H.P.
Induction Types
1/1400 to 1/4 h.p.

EMC and CYCLOHM fractional H.P. motors, available with or without gear units, permit a wide range of use and versatility to meet your small motor requirements.

EMC model 100 (illustrated) is specifically designed for aircraft applications rated from 1/13 to 1/100 H.P.

Check the partial list of applications below, and write for our catalog and full information. Write today!

CHECK EMC AND CYCLOHM FOR THESE AND SIMILAR APPLICATIONS

Autopilot Systems	Cabin Supercharger
Shut-off Valves	Wing Flaps
Master Direction Indicator	Trim Tabs
	Rudders
Air Distribution System	Ailerons
	Elevators
Cowl Flaps	Bomb Releases
Cabin Air Blowers	Gun Charging Motor
Landing Gears	And many more.

Dept. A
HOWARD INDUSTRIES, INC.
RACINE, WISCONSIN
DIVISIONS:
EMC ELECTRIC MOTOR CORP.
CYCLOHM MOTOR CORP.

HOWARD

A. W. (BILL) JESSUP (right) talks battle tactics with Rear Adm. E. C. Ewen, former commander on previous tour aboard Essex.

per bomb dropped for the jets as against the ADs and F4Us. During the period of September through January the jets recorded 1.3 cuts in the Communist railroad track per sortie against 1.5 cuts per sortie for the props. But considering the fact that on the average the props carried two to three times the number of bombs, the jet accuracy of 32 to 33% cuts per bomb dropped is higher.

In the Banshee, the only problem for the pilot in dive bombing is wind drift. There is no torque. The drop speed is faster, perhaps 100 knots faster, so there is less time for wind effect on the bomb after released. Pilot's praise the Banshee's wing dive brakes.

• **Climb and maneuverability.** With a bomb load, the Banshee can outclimb any other Navy plane out here. It's over twice as fast uphill as the Panther; starting level off the carrier, the Banshee will be at 30,000 ft. when the Panther reaches 14,000. Banshee pilots say they can get into and out of places that prop planes can't. The normal pull-up from a diving run is 6,000-7,000 feet and the Banshee can fly right up the contour of the mountain to that altitude.

• **Vulnerability and durability.** The Banshee's speed provides a lot of protection. Only 40 Banshees have been hit by enemy ground fire, compared with well over 300 for the rest of the air group. On a per sortie calculation, the Banshees were hit only about half as often as the Panthers and only one-quarter as frequently as the props. Of the 40 hit, only two were lost over the beach, and, in both instances, it appeared that the pilots were hit.

The air group lost 45 airplanes shot down. The natural rugged construction of jet aircraft hold the Banshee and the Panthers together even when seriously damaged. Banshees and Panthers have flown back with serious damage to main and rear wing spars. The durability of the Banshees, however, has created one problem. It takes a lot of expert sheet metal work to repair battle damage, since flush patches are necessary.

• **Availability.** Banshee availability rates exceeded those of other aircraft aboard. They also set new records for consecutive launchings without a dud, carrier terminology for a flight-deck spotted plane which can't get off. One string carried through 284 launches and another went to 205. The Navy normally expects one dud in every deckload. The squadron also made 1,318 consecutive carrier landings without accident.

• **Maintenance.** Jet maintenance aboard carriers is much less trouble than conventional aircraft maintenance. There are many complaints over complexity of the electrical setups. There are too many, too complicated electronic relays, many of which, maintenance men believe, can be simplified or eliminated. Despite this, the jet maintenance men have it a lot easier than their counterparts struggling with the Skyraiders and Corsairs.

Simplicity and ease of engine change is one advantage. The J34 engine on the Banshee has been changed in one hour without any push. With everything all ready an AD engine change

EYES OF *FLIGHT*

Eyes of flight—the PLEXIGLAS canopies, domes, noses, windows on today's fighters, bombers, transports, helicopters. Through these transparent shields against wind and weather, the men who fly our country's planes obtain their all-important unobstructed view.

Some of these PLEXIGLAS enclosures are monolithic, some are laminated. Many are formed from PLEXIGLAS II, the improved grade of this acrylic plastic, with its increased resistance to heat, weather, and crazing. All of them have the clarity, strength, light weight, formability, dimensional stability, and weather-resistance that have established PLEXIGLAS as *aviation's standard transparent plastic.*

To make the most efficient use of PLEXIGLAS in aircraft applications, call on the Rohm & Haas service staff and technical representatives. Their services are backed by years of close cooperation with the aircraft industry on the design and installation of PLEXIGLAS enclosures.

PLEXIGLAS is a trade-mark, Reg. U. S. Pat. Off. and in other principal countries of the Western Hemisphere.

Canadian Distributor: Crystal Glass & Plastics, Ltd., 130 Queen's Quay at Jarvis Street, Toronto, Ontario, Canada

CHEMICALS FOR INDUSTRY

PLEXIGLAS

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

ENGINEERS NOTEBOOK
ONE COUPLING
HEATING SYSTEMS
ONE SET OF FLANGES
For ALL Heat Duct Connections
Any ducting problem in low pressure heating systems can be solved by a standard Marman V-Band Coupling and its integral welded flanges. The small type coupling (Series #4426) is usable for diameters from 4" to 8" and the large type (Series #4451) for diameters of over 8". Both will withstand temperature ranges of −65°F to 450°F and operating pressures of 2.5 p.s.i. and provide a highly efficient lightweight seal. The patented Quick Coupler type latch speeds production and simplifies maintenance.
Save Cost, Time and Weight with Marman
FOR INFORMATION, WRITE DEPT. W-4
MARMAN PRODUCTS CO., Inc.
940 W. FLORENCE AVE.
INGLEWOOD, CALIFORNIA
STANDARD CLAMPS FOR SPECIAL APPLICATIONS

Banshee Data

McDonnell Aircraft Corp., St. Louis, Mo., received experimental contract from U. S. Navy in March, 1945 for XF2D-1 Banshee (later redesignated XF2H-1). . . . This was development of the earlier XFD-1 (XFH-1) Phantom which first flew in January 1945, was first U. S. jet to land and take off from a carrier, July 21, 1946. . . . Prototype XF2D-1 first flew Jan. 11, 1947, first production model (F2H-1) was delivered August 1948. . . . First F2H-2 (tip tanks, equipment changes) was flown August 1949. . . . 462 various F2H models procured through fiscal 1950. . . . Later models include F2H-2N, night fighter; F2H-2P, longer-nosed photo-reconn. type; and the new F2H-3, which has longer fuselage, revised tail, increased fuel, improved armament.

F2H-2 Basic Data:

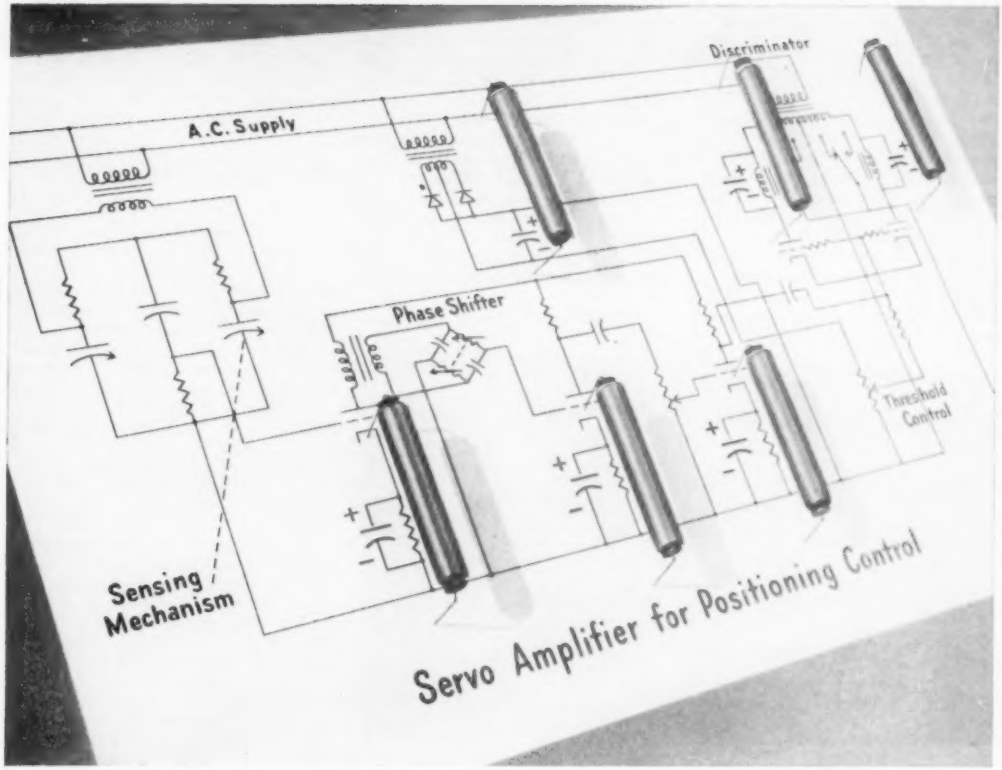
Power	2 Westinghouse J34 (4 approx. 3,000 lb. thrust ea.
Max. speed	Over 600 mph.
Span	44 ft. 11 in.
Length	40 ft. 1 in.
Gross weight	16,000 lb. plus
Fuel	1,200 gal. plus.
Max. range	2,000 mi. plus.
Rate of climb	9,000 fpm. plus.

can be made in four hours, but normally it takes two days. One Banshee, recovered (landed from a mission) at 8:30 one morning, had an engine changed and was ready to go on the 11:15 launch. Quick disconnects for fuel and oil lines and cannon plugs on the electrical circuits make the change easy.

In the new setup, all fire detection circuits formerly on the engine are on the airframe, eliminating much of the earlier trouble in making engine changes. Another advantage for the jets is the quick and easy interchangeability of entire tail sections on the airframe.

▶**A Case for J34**—Banshee pilots are very pleased with the performance of the J34 axial flow engines. It once was thought that this engine would not stand up when hit in combat. But time and again, these engines have been hit, and the pilot hasn't known it until the maintenance men checked the plane back on the carrier. They also think the twin-engine design is best for attack airplanes.

The Banshee will fly without trouble on one engine, a great comfort to pilots. It also saves engines. If something happens to an engine, the pilot can



Tantalytic Capacitors get key role in "servo" circuit for positioning control

This servo-amplifier circuit controls the positioning of equipment which operates in high altitudes. Its capacitors must provide stable operation in widely varying temperatures. They must withstand considerable vibration. And their size and weight have to be kept to a minimum—without sacrificing operating life.

To meet these requirements, our capacitor application engineers recommended General Electric Tantalytic capacitors. These capacitors offer an operating temperature range from −55°C to +85°C —with at least 65% capacitance at −55°C. They contain a non-acid electrolyte—making them chemically stable and providing long operating life. They combine large capacitance with small size and weight. And they have the ability to withstand severe physical shock.

Other features of G-E Tantalytic capacitors include: exceedingly low leakage currents, extremely long shelf life and complete hermetic sealing. They're presently available in ratings from .1 muf to 12 muf at 150 volts d-c.

If you have a similar large-volume application where a low price is secondary to a combination of small size and superior performance—it will pay you to get in touch with us. You can get more complete information on the outstanding characteristics of Tantalytic capacitors from your local G-E representative. Or write General Electric Company, Section 407-309, Schenectady 5, New York. Ask for Bulletin GEC-808.

General Electric Company, Schenectady 5, N. Y.

GENERAL ELECTRIC

shut it off and come home on the other. But in a single-engine jet, he has to push on with it, often doing irreparable damage getting home.

Major problems have been with starters. External electrical power is unreliable in cold weather. The Navy is awaiting air turbine starters like those the Germans used on their jet aircraft which the Russian MiGs may be using. Compressed air turbine will provide surer, more gentle starts with initial ignition at low rpm.

One of the most revealing attacks made by the Banshees was against two long railroad bridges at a key crossing in central Korea. Eight Banshees, each carrying two 500-lb. bombs, participated. They climbed to 20,000 ft. going in over the east coast and reached 25,000 ft. as they neared the target area. Then the planes split into two flights.

▶ **The Run**—On their Mach, the Banshees peeled off in a straight-in dive bomb attack starting at 25,000 ft. They dropped all 16 bombs before the anti-aircraft artillery around the heavily defended twin-target fired their first shots, and pulled out without being hit. On this single pass, one span was knocked down on one bridge and five spans on the other.

"CAG 5 turned the jet from a defensive to an offensive weapon of naval airpower," Adm. John Perry, until recently commander of this Task Force, told me. He adds, "This tour of the air group and the Essex proved that the jet is just another airplane as far as carrier air operations are concerned."

The Long View

If war with Russia comes—and that is the ultimate war which the U. S. must be prepared to win—Navy airpower must contribute to victory by destroying the submarine bases, harbors, airbases and communications centers around the periphery of the Soviet bloc.

The Navy plans to swing fast carrier task forces at these periphery targets in sudden devastating attacks. It believes these will limit the submarine and air menace to the free world's supply lines, keep the enemy off balance, force him to spread forces thinly along his borders and limit his capabilities of waging battle against our and and our allies' armies.

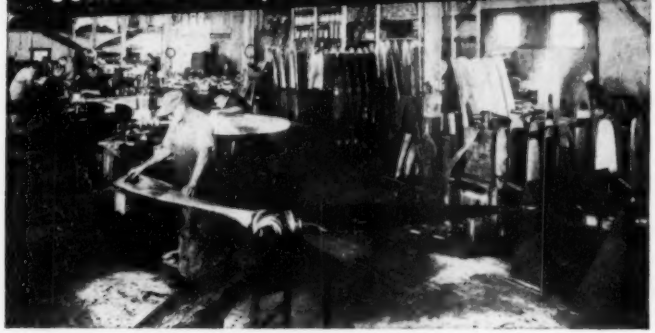
Aircraft carriers first must get within range of these targets. Against a major enemy, such as Russia, it is expected that 200 mi. is about the closest approach that should be made to unfriendly land. Navy men figure they can evade detection in moving to this range from worthwhile enemy targets, provided they have searoom in which to maneuver; searoom of one day's sailing in most directions is considered adequate.

▶ **Too Much Talk**—In a war with Russia, the Sea of Japan would not provide searoom nor, except under unusual conditions, would the Mediterranean. A lot of Navy men discredited their own service by making fantastic claims like that made by a high ranking officer before a class from the War College some years ago. He expounded at length about carriers operating with impunity in the Adriatic. Any properly screened task force would probably run aground there; it certainly would be a sitting-duck for enemy dive bombers.

Obviously, the payoff comes only when the plane-borne bomb, rocket, napalm or other armament hits and destroys the target. Aircraft, therefore, perform the final step by moving the armament from the carrier to the release of firing point over the target. It also is normally necessary that enough aircraft return to the carrier for other missions on other days, although conceivably there are targets so important that sacrifice of all attacking aircraft would be justified.

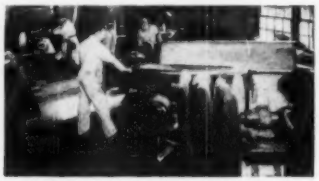
Generally, therefore, air superiority is needed if Navy airpower is to do its job. But air power is moving toward a new superiority concept. Traditionally,

COMPLETE Propeller Overhaul & Repair



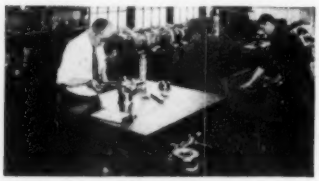
15,000 sq. ft. devoted exclusively to the specialized repair and overhaul of all types of metal propellers.

Complete facilities for the repair and modification of all types of governors.



Fully equipped with modern machinery including hydraulic press and twisters.

All balancing performed in separate balancing room.



Rigid process and final inspection of every component part.

APPROVED REPAIR STATION No. 3503.

Write or call for further information.

THE Propeller Service Corporation

BRADLEY FIELD • WINDSOR LOCKS • CONN.

DOUGLAS

DC-6B TRANSPORT

Equipped with

WITTEK

Aviation

HOSE CLAMPS

STANDARD OF THE INDUSTRY
FOR OVER A QUARTER CENTURY

AN737-TW · TYPE WWD (Tangential—with one-piece housing)
AN737-RM · TYPE FBSS (Radial—with floating bridge)

WITTEK MANUFACTURING COMPANY
4305-15 WEST 24TH PLACE • CHICAGO 23, ILLINOIS

The engineering department that consistently produces the "best" at the right time—B-25, F-51, T-6, now the F-86 *Sabre* jet series, AJ-1, FJ-1, FJ-2, T-28, B-45—offers engineers a real opportunity to become a part of the advance idea teams that are designing today for tomorrow and the future of aviation. Become a part of the outstanding aircraft engineering group in the aircraft industry by writing for complete information on career opportunities at North American. Please include a summary of your education, background and experience.

North American Extras—

Salaries commensurate with ability and experience • Paid vacations • A growing organization • Complete employee service program • Cost of living bonuses • Six paid holidays a year • Finest facilities and equipment • Excellent opportunities for advancement • Group insurance plan • Sick leave time off • Generous travel allowances • Employees Credit Union • Educational refund program • Low-cost group health, accident and life insurance • A company 24 years young.

CHECK THESE OPPORTUNITIES AT North American

Aerodynamicists
Stress Engineers
Aircraft Designers and Draftsmen
Specialists in all fields of aircraft engineering
Recent engineering graduates
Engineers with skills adaptable to aircraft engineering

NORTH AMERICAN AVIATION, INC.

North American Has Built More Airplanes Than Any Other Company In The World

Engineering Personnel Office
Los Angeles International Airport
Los Angeles 45, Calif., Columbus 16, Ohio

air superiority meant first the destruction or neutralization of all enemy aircraft. This may be impossible in the future and may not be necessary.

A simpler more direct definition is emerging for offensive air superiority: Air superiority is the capability of destroying or neutralizing an enemy's means of waging war by the use of airborne weapons.

► **Guided Missiles**—Such a definition is broad enough to cover guided missiles which someday are likely to supplant piloted airplanes. It also provides room for the proper consideration of anti-aircraft artillery and target-seeking, ground-to-air rockets which are becoming an ever increasing threat to attack aircraft. Surprise and speed become the important factors in maintaining offensive air superiority.

Until rocket-powered missiles, providing the utmost in speed and therefore the utmost in immunity from enemy interception, become a practical attack weapon, the Navy will depend on piloted aircraft. The major conclusion it draws from Korean experience is that only high performance aircraft, probably jets, flying at near- or super-sonic speeds, can deliver armament to the sub pens, harbors, air bases and communications centers of the enemy.

Only the high speed planes have a chance of getting through before defensive interception or anti-aircraft fire stop them. With the development of new bombs of greater explosive force, including the latest lightweight atomic tactical and strategic types, the need for the slow flying heavy-load toter, such as the AD, diminishes. What is required is the bomber that has the best chance of getting through and the best chance of hitting the targets.

► **Turboprop Out**—Today, it looks like the jet is the best bet. Gearing problems have pretty much ruled out the Douglas XA2D counter-rotating turboprop with which the Navy hoped to supplant the AD. Out here the air team on the Essex was counting more on the F2H-3 Banshee with its increased fuel and bomb-carrying capacity, the F7U Cutlass and the Douglas A3D.

None of these, however, quite provides the lightweight attack plane capable of handling a bombload of 3,000 to 4,000 lb. and adaptable for many other configurations. With the advent of the jet there is a possibility that Navy could get close to its dream aircraft: a single basic type for carriers.

The Future

Looking into the future with Adm. Perry and Comdr. Marshall Beebe, here's how a single, multiple-purpose plane might develop:

• Start out with a rugged fuselage of Mach 1 characteristics at least; make it unlimited Mach if possible.

• Fit it with interchangeable nose sections: One nose configuration for guns, another for cameras another for radar and, perhaps, another for air-to-air rockets.

• Design interchangeable wings: One, of course, for the bomb carrying job, and while it's being designed for this purpose why not equip it with disappearing bomb racks that go flush into the wings? Another wing would be swept for super-sonic speeds. Changing a wing isn't such a tough job, so with a batch of high-speed wings hanging from the ceiling of the hangar deck, a carrier would have a greater degree of flexibility. It would provide a first rate fighter when needed.

• Equip it with twin engines mounted in the wing roots.

• Design a wide-tread undercarriage similar to that of the Banshee. This makes deck handling easy. The narrow tread on the Panther plus the out-board slant of the folded wings is dangerous for deck handling. A high wind very easily turns the Panther over.

► **Too Much Gear**—Comdr. Beebe worries about plane weight and the overloading tendency in present-day American aircraft design. He thinks designers might tailor the gear for the varied types of missions into packages to go with the nose sections.

He believes the U.S. would learn a lot by taking the first plane off the production line and stripping it down to stick and throttle, then replacing the gear that is necessary, and replacing only that which is *absolutely* necessary for the combat job. He thinks we would end up with lighter, better performing airplanes or we would scrap the design as unsatisfactory.

Both the admiral and the commander are alarmed at the failure of Navy and of the aircraft manufacturers to send all top-design and development engineers out here to see what is going on. Many of the trends for the future can be found in the Korean operations. And the best way to find out is from the men who are doing the flying and the fighting while they are actively engaged in combat.

The Navy has licked its jet bogey, but there's a long way to go.

New WAPD Office

Western Air Procurement District has moved its San Francisco-Oakland regional office to larger quarters at 1515 Clay St., Oakland. Previous location was at 405 14th St.

WAPD has also established an Arizona regional office with Lieut. Col. James L. Patillo, USAF senior pilot, as regional representative.

Making walkways for Banshees

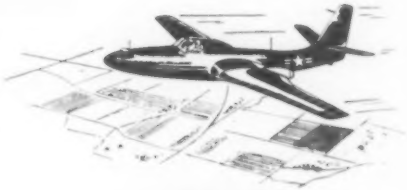
Making non-skid walkways for airplane wings might not seem like a difficult problem. But keeping any kind of coating on jet-powered wings is next to impossible . . . the windstream tends to peel it off.

The McDonnell Aircraft Company, makers of the Navy Banshee jet fighter, asked 3M for a product that would stay on, yet be flat enough not to set up wind resistance and affect the plane's flight characteristics. 3M engineers suggested this: a primer coat of adhesive and a final coat of Corogard #22, a non-skid coating. The new walkway passed all flight tests, and is now part of the airplane.

Modern adhesives engineering is solving problems in many industries. When you investigate the possibilities of adhesives, come to 3M, leading producers of more than 1000 adhesives, coatings and sealers that do a top-quality job in all industries.

See what adhesives can do for you . . .

Want to know more about 3M corrosion- and abrasion-resistant coatings, or all-purpose Corogard coatings? Call your 3M salesman or write 3M, Dept. 114, 411 Piquette Avenue, Detroit 2.



3M COMPANY

OVER 1,000

ADHESIVES · COATINGS · SEALERS

ADHESIVES AND COATINGS DIVISION • MINNESOTA MINING AND MANUFACTURING COMPANY

411 PIQUETTE AVE., DETROIT 2, MICH.

GENERAL SALES OFFICE: ST. PAUL 6, MINN.

EXPORT OFFICE: 270 PARK AVE., NEW YORK 17, N. Y. • IN CANADA: LONDON, CANADA

MAKERS OF "SCOTCH" BRAND PRESSURE SENSITIVE ADHESIVE TAPES • "SCOTCH" BRAND SOUND RECORDING TAPE • "SCOTCHLITE" BRAND REFLECTIVE SHEETINGS • "3M" ABRASIVE PAPER AND CLOTH • "3M" ADHESIVES AND COATINGS • "3M" ROOFING GRANULES • "3M" CHEMICALS

Duo-Mono Configuration Now Stall-Proof

- **Inherent boundary-layer control is basic feature.**
- **Wing and tail surfaces function as single wing.**

By David A. Anderton

Inherent boundary-layer control is the outstanding feature of a novel wing configuration which promises amazing low-speed performance for fixed-wing aircraft.

Four basic advantages over conventional ideas are claimed for the layout—called the Duo-Mono principle:

- Stall elimination.
- Increased power-on lift.
- Decreased fuselage drag in high-speed altitude.
- Greatly increased airplane drag when needed.

These advantages are attributed to the wing geometry—a pair of tapered wings with positive gap and stagger of such proportions as to create favorable aerodynamic phenomena. Patents and patent applications are owned by the Pardel Development Corp., of New York, sponsor of the design.

▶ **Prewar Development**—The Duo-Mono configuration is not new. Originally developed by empirical methods in France before World War II, the novel wing geometry was incorporated in a number of gliders and single-engine craft built there.

Flight and windtunnel tests were made by the French Air Ministry; more recently, confirming tests on later designs have been made at two laboratories in this country. Careful theoretical analysis has helped to explain some of the astounding results of these tests.

Although the biplane terms of gap and stagger were used to describe the wing spacing, the Duo-Mono principle is not a variation on a biplane theme. Neither is it a tandem-winged setup, nor a wing plus a greatly enlarged horizontal tail. The results of tests and analysis indicate that these lifting surfaces function as a single wing with a slot of very large chordwise gap.

▶ **Typical Design**—Consider a typical aircraft design using the Duo-Mono principle. Both wings are load-carrying, and no horizontal tail is fitted. (A strikingly similar configuratoin, developed in postwar France in the Millet-Lagarde aircraft, does require a horizontal tail. It appears to lack some of the advantages of the Duo-Mono idea.)

The front wing, which represents about two-thirds of the total wing lifting area, is fitted with ailerons and flaps. The rear wing carries ailerons and elevators, and at its tips, rudders and fins.

Twin engines are mounted on the forward wing—a more productive layout than a single engine one because of increased slipstream effects. The slipstream from the tractor propellers covers about 70% of the wing surface.

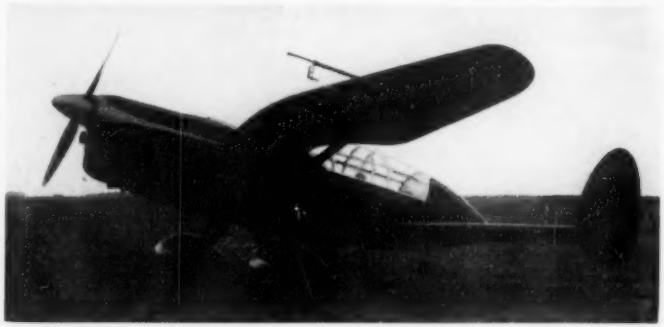
▶ **Advantages**—Three of the four advantages claimed by Pardel for the layout are aimed at the lowspeed end of the velocity spectrum.

- No model of any aircraft with the Duo-Mono wing principle has shown any indication to stall, even at angles of attack as high as 30 deg.
- In the Duo-Mono layout, power-on lift is greater than conventional magnitude because of the larger percentage of wing area wetted by propeller slipstream.
- At constant, high lift coefficient, the form drag of the configuration increases strongly with angle of attack. This is an advantage for low-speed approaches, because the airplane can be made clean by merely retrimming the craft.

The decreased fuselage drag at high speeds, deducible from windtunnel tests and theory, is attributed to delayed boundary-layer separation from the fuselage, which is forced by the wing pressure fields.

▶ **Other Gains**—There are other advantages which result from aircraft using the Duo-Mono proposal.

- **CG travel.** Lifting the load-carrying fuselage at two widely displaced points instead of at one permits a large center-of-gravity travel. This has been borne out by windtunnel and flight tests, which have shown that the airplane is quite insensitive to large variations in the CG location. This variation can possibly be many times conventional figures. One test showed that a CG travel of 67% of the mean aerodynamic



PROTOTYPE sport plane, shown here, was built in prewar France and has been a . . .

FLYING test bed for Duo-Mono principle. Photos emphasize unusual layout features.

Now- FOR THE FIRST TIME

Self-Locking Screws, Bolts!

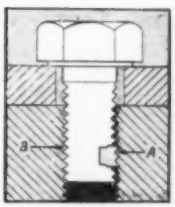
Meet AN locking requirements;
Eliminate safety wire, lock washers, set screws, jam nuts

Now the Nylok principle of locking threads with the smooth wedging action of a nylon plug has been applied to screws and bolts.

The new Nylok screws and bolts are self-locking in any position, seated or unseated. They lock where stopped; they eliminate costly, time-consuming safety wiring and lock washers. No thread mutilation, nor backing out. Locking is positive even when seated against gaskets.

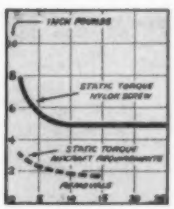
Nylok now enables you to design for simplified fastening, with full safety, for faster assembly time and easier servicing.

Presently available in sizes # 8 to ½ inch, lengths ¼ inch up



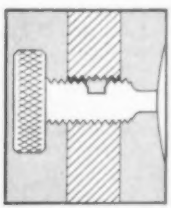
How Nylok Locks:

Resilient nylon plug (A) sets up lateral thrust, smoothly wedging mating threads together (B). All of locking action is on the threads; head is not stressed. Locking is positive seated or unseated.



Repeated Uses:

Typical curve shows high removal torque, in inch-pounds, after repeated installations, compared with AN requirements. Curve is for 10-32 size; other sizes are equally superior to requirements.



Adjusting Mechanisms:

Nylok adjusting screws insure quick, accurate adjustment with wrench or screw driver. Setting remains constant against vibration. No spring loading, jam nuts or other old style holding designs.

Vibration Proof:

With old-style screws, best time was 8 hours before military truck carburetors were loosened in desert proving ground grind. Locked with Nylok, carburetor fastenings were still tight after 30-day test.

NYLOK offers these Advantages

- Positive locking
- Eliminates safety wire, lock washers, jam nuts
- Re-usability
- Interchangeability
- Locks without seating
- Standard head sizes, types
- Standard overall lengths

Write or Wire for full specifications

THE NYLOK CORPORATION

Plant—Elmira Heights, New York *New York Office—475 5th Ave., New York, N.Y.*

Manufacturers of Nylon-Locked Fasteners. Covered by U.S. patents and patents pending

HARTWELL

Trigger-Action

FLUSH LATCHES AND HINGES

The World's *best* and most *complete* line for every aircraft application . . .

"Make them *flush, safe* and *simple!*" was the plea of aircraft builders to the latch and hinge manufacturers.

So HARTWELL did. *Flushness* for streamlining to eliminate external load conditions. *Safe*, rugged compactness for dependable performance. *Simple*, positive-action to speed up maintenance operations.

Finger-tip pressure on the trigger of the latch releases the bolt and permits the door to open. Finger-tip pressure on the bolt, when the door is in place, locks it shut.

Aerodynamically flush and safe, they meet or surpass stringent miltiary requirements.

Investigate the advantages of HARTWELL equipment. They add up to efficency and value unsurpassed in today's aviation industry.

Write for engineering specifications and counsel.

HARTWELL

AVIATION SUPPLY COMPANY

Manufacturers of Aircraft Flush Latches and Hinges, Fittings and Cable Terminals.

9035 Venice Boulevard, Los Angeles 34, Calif.
Branch Office: Wichita, Kansas

chord was possible. This compares with usual values of 7 or 8%.

• **Horizontal tailout.** The wing configuration eliminates the horizontal tail and the fuselage extension which is used to hold the tail on. Thus, the whole fuselage length can be used for loading—the CG travel permits this.

• **Structural efficiency.** It also would appear that a higher structural efficiency—the ratio of gross to empty weight—can be realized with the Duo-Mono layout.

► **Corroboration**—There have been proponents of wing configurations before who have claimed increased aerodynamic efficiency. Generally, none of these has had enough technical evidence to support his claims.

Pardel has at hand three sets of tests which show experimental corroboration of the group's claims:

• The earlier tests, made in prewar France, include scale-model runs at the Eiffel laboratory, full-scale tests at Chalais-Meudon, and flight tests made by the French Air Ministry.

• The second set of model tests were made by Beechcraft in the University of Wichita windtunnel.

• The third set are small-scale windtunnel tests made by the U. S. Navy's BuAer at the David Taylor Model Basin. The results of these tests have not been made public, but Naval Aviation News, official BuAer-CNO publication, had this to say about them:

"BuAer was interested in the design, but . . . wished to obtain performance data on a model of a configuration of this type which might eventually be usable as a Navy plane.

"The laboratory . . . ran it through tests in one of the lowspeed tunnels. These tests showed that, while the general characteristics of the proposed plane did appear good, further development was needed to bring the ratio of maximum speed to landing speed into more practical balance."

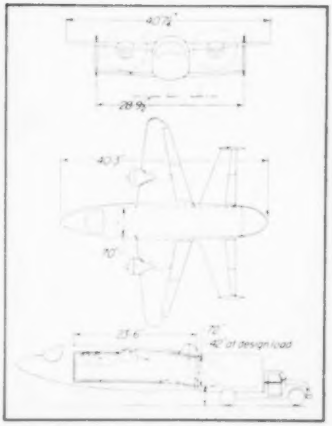
These further developments took the form of a suggested leading-edge slot and a trailing-edge slotted flap (replacing the plain flap of the proposal). In addition, fairings were developed around the canopy and at the aft wing-fuselage junction.

► **Test Results**—Out of all these tests have come some remarkable results.

One example: the model has not yet been stalled. Angle-of-attack mechanisms used in the tunnels did not permit testing above a 30-deg. angle. At that point, the wings were maintaining the maximum lift coefficient.

Another example came from the French flight tests, which showed extremely high lift coefficients in the landing configuration with flaps down and power on.

Interference effects present in the usual wing-fuselage combinations do not exist in the Duo-Mono layout; or if



PARDEL'S 1½-ton Duo-Mono cargo transport.

they do, their final effect is beneficial.

Actually the Pardel proposal uses a combination of wing-fuselage intersections which have high interference effects. (This has been shown by NACA tunnel tests on single wing-fuselage combinations—not Pardel's but of similar positioning.)

Yet taken together, the net effect of these high interferences is not only to show no adverse interference, but to reduce the fuselage drag to a value corresponding to skin friction only!

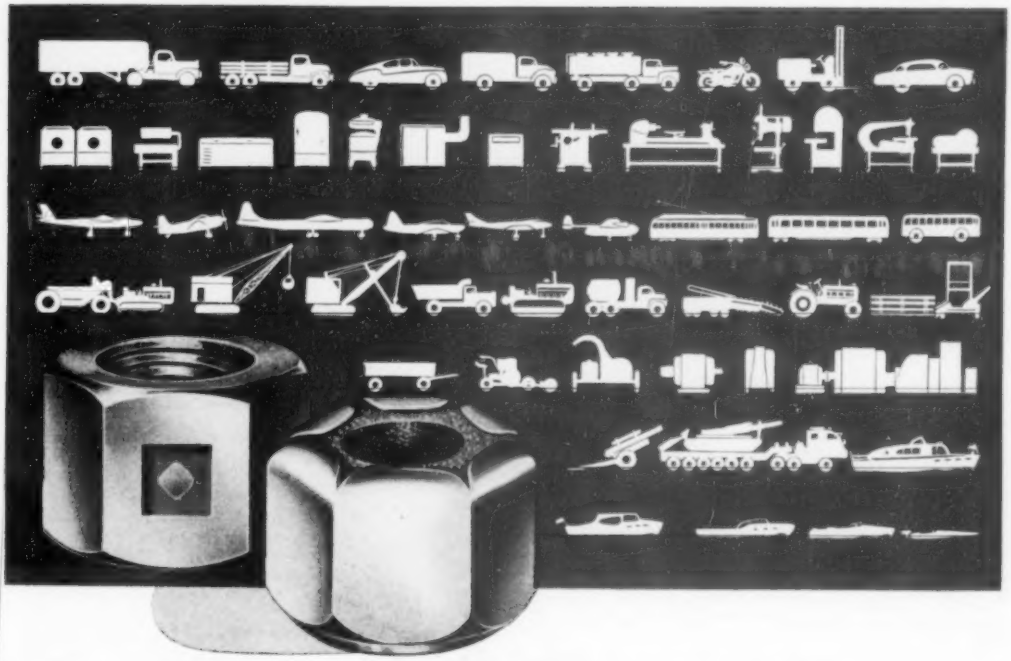
The tests have also shown that in the angle of attack range between 10 and 29 deg. the airplane could be flown with no decrease in lift and with considerable increase in drag. This means that an airplane could be brought in for a landing at practically any desired throttle position, and the attitude of the craft can be changed to balance drag against thrust component.

Thus the aircraft can be dragged into a small field at high power settings under complete control and with unstalled wing. Also the high drag means a short landing run.

► **Analysis**—These results were either directly obtained from the windtunnel and flight tests, or deduced from them. The Pardel people wanted to know if there were any way to tackle the problem from a theoretical viewpoint in order to have a quantitative explanation for the test results. They called in Prof. Paul Lieber, then at Polytechnic Institute of Brooklyn, and now at Rensselaer Polytechnic Institute, as consultant. He put the test results and potential flow theory to work, using as a clue a very important result of the tunnel tests.

That clue was that the drag of the upper wing plus fuselage was always greater than the drag of both wings plus fuselage.

This immediately suggested the hy-



Fasteners with *Built-In* Emergency Brakes

Just as the emergency brakes on your car set the wheels, these Townsend Locknuts apply positive pressure to keep bolted connections tight at all times even under severe vibration and shock. Through use of organic inserts, they grip the bolt securely—stay put under a variety of adverse conditions until removed with a wrench—can be used again and again. Their use adds safety, improves products and speeds installation time—lockwashers and double assembly are eliminated. As these locknuts are cold-headed instead of being machined from bar stock, their use saves critical material, keeps costs down.

The "brake-bands" or locking elements in these nuts are provided by inserts of fibre or nylon. The Townsend *Tufflok Nut** on the right is cold forged in one piece and has an exclusive petal design to assure staking of the hexagonal fibre insert which cannot loosen and turn in its seat. The Townsend *Nylok Nut** on the left, is cold forged in one piece, uses a tough nylon plug as the locking medium. Both inserts resist moisture, dryness, gasoline and lubricants. Townsend Locknuts are available in sizes #4 through 3/8 inch.

These locknuts are but two of the more than 10,000 special and standard devices produced by Townsend in a variety of metals and finishes for fastening metal, wood, plastics, glass and fabrics. For this reason, regardless of your fastening problem, Townsend sales engineers always give you unbiased recommendations—will supply the best fastener for your particular need. Back of these men is the experience of 136 years of wire drawing and metal-working experience in producing cold-headed fasteners and small parts.

For information on how you can speed operation—lock in the quality of your products by fastening them securely with Townsend Locknuts, write for Bulletin TL-63 today.

Townsend

COMPANY • ESTABLISHED 1816

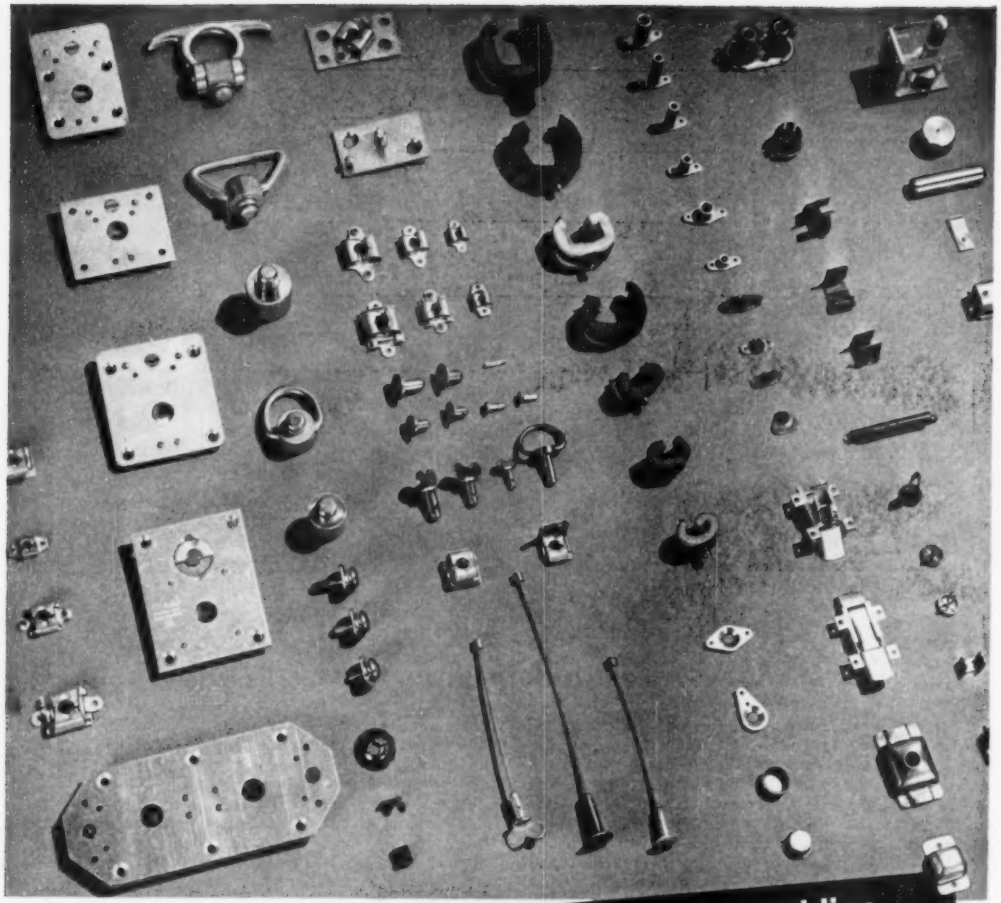
Plants—New Brighton, Pa. • Chicago 38, Ill.

Cherry Rivet Company Division, Los Angeles, California

Sales Offices in Principal Cities

*Townsend Company registered trademark
The Nylok Corporation license

THE FASTENING AUTHORITY—Experience: *over 136 years*—**Capacity:** *sixty-million parts daily*—**Products:** *over ten thousand types of solid rivets—cold-headed parts—Cherry Blind Rivets—self-tapping screws—tubular rivets—locknuts—special nails—formed wire parts.*

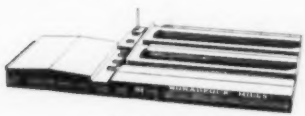


From Metal Stampings To Finished Assemblies . . .

AIRLOC
SOL-A-NUT
WIRE HARNESS BAND
ADAMS-RITE WEDJIT
FABRI-LOC
SNAP-IT-TRIM

. . . our service is complete. We manufacture a variety of specialized aircraft fasteners and our design and engineering staff is ready to modify these or design completely new fasteners to your specifications.

Monadnock, with a wealth of fastening experience, welcomes inquiries from manufacturers who seek reliable development and production facilities.



subsidiary of
UNITED-CARR FASTENER CORP.

MONADNOCK MILLS
San Leandro
California

pothesis of favorable aerodynamic interference. Lieber's logic followed this pattern: If you do have favorable interference, this might control the boundary layer on both lifting surfaces and possibly even on the fuselage which supports them.

So it is plausible that high-velocity air flowing over the lower wing would produce a favorable pressure gradient on the upper wing; and further, that the downwash shed by the upper wing would add energy to the boundary layer of the lower wing and therefore delay separation.

Between the wings, you could have a low-pressure area which should also delay separation of the fuselage boundary layer.

▶ **Calculations**—This was logical argument; it had to be backed up with calculations. Lieber developed pressure distributions for upper and lower wings, based on potential flow theory for a doubly connected space. He chose for the analysis a two-dimensional section at the mean aerodynamic chord. The theory used would apply to any spanwise section. Angles of attack chosen were 6 deg. 4 min., 15 deg. and 25 deg., and the airfoil was the NACA 23012.

At all angles of attack considered, there was a very favorable pressure gradient on the upper wing at about 12% of the chord forward of the trailing edge. But ahead of this, the gradient was generally adverse. This suggests that although the gradient near the trailing edge should be a help in preventing separation, it should not have much effect in preventing stall of the upper wing at high angles of attack; the tests showed this. The lift coefficient of the upper profile dropped at angles of attack considerably less than 28 deg.

But this dropping was gradual, rather than sharp; and the change from usual NACA 23012 airfoil characteristics was attributed to the pressure gradient; this also showed in the tests. The lift curve for the upper wing in the presence of the lower was much more favorable than in the absence of the lower wing.

▶ **Lower Wing**—Pressure distributions over the lower wing show that its boundary layer is probably energized near the leading edge by high-velocity air. But downstream of this region the pressure gradient is very weak. So Lieber argued that it is plausible to attribute the favorable stall characteristics of the entire configuration to the favorable velocity and pressure distributions over the lower wing.

Thus it follows that the primary function of the upper wing is to act as a vane for directing the flow over the lower wing. In other words, theory proves out the supposition that the two lifting surfaces function as a single wing with a slot of large gap.

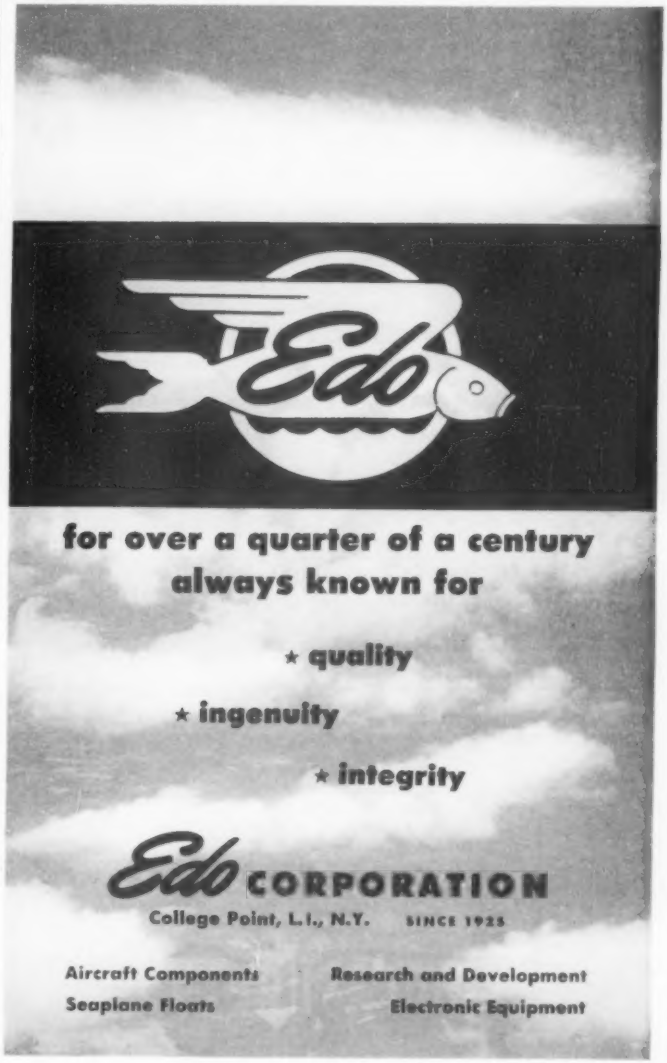
One other point brought out by Lieber's analysis reconciled the fine stall characteristics with only an average maximum lift coefficient. If these stall characteristics were attributed solely to complete delay of boundary layer separation, two things should happen: The maximum lift coefficient would increase steadily with angle of attack; the overall form drag would be much smaller at high angles of attack. But this doesn't happen with the Duo-Mono layout.

Since the upper wing begins to lose lift before the lower wing, then after stalling of the upper wing, the lifting force comes almost entirely from the lower wing. And this surface, by virtue of the slot effect of the upper wing, is virtually stallproof.

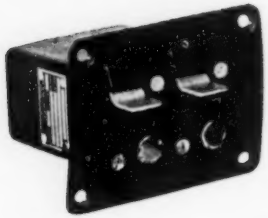
As a result, the lift coefficient at high angles of attack stays at about a constant value, with the loss of lift on the upper wing balanced by the gain on the lower. It is the partial stalling of the upper wing that causes the increased formdrag of the configuration at high angles of attack.

Lieber made one recommendation: It should be possible to increase the value of the maximum lift coefficient by increasing the area of the lower wing and reducing that of the upper wing.

▶ **For High Lift**—With power off and

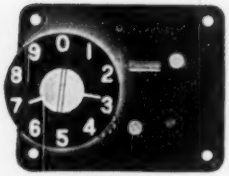


NOW SAFE FLIGHT BRACKETS THE PRE-STALL ZONE



Now Safe Flight, pioneer in stall instrumentation, offers progressive pre-stall detection to provide not only infallible pre-stall warning but also to bracket precisely the best landing approach speed for any gross weight condition.

The new multiple sensing unit on the wing's leading edge triggers the Safe Flight coaxially-mounted stick shaker which operates with variable amplitude to provide artificial pre-stall warning plus approach control with more precise definition and more exact margin than possible by any aerodynamic buffeting.



Simply DIAL Your Pre-Stall Margin!

Safe Flight stall sensing units now incorporate this adjustment dial to permit simple exact adjustment to any desired pre-stall warning margin for ideal approach speed control.

Safe Flight stall instrumentation systems are now standard on many armed services, airline and commercial aircraft. Your inquiry will bring prompt cooperation from our engineering staff in discussing your pre-stall instrumentation problems.

SAFE FLIGHT INSTRUMENT CORPORATION
White Plains, New York
PIONEERS IN STALL INSTRUMENTATION

flaps down, the maximum lift coefficient obtained will be comparable to conventional aircraft design. But it is possible to obtain much higher lifts because of the propeller slipstream.

The thrust component (at the high angles of attack) and the increase in dynamic pressure in the slipstream (which covers almost ¾ of the total wing area) can show power-on lift coefficients as high as three times conventional magnitudes.

This dependence on the propeller for the lift increment brings out one apparent disadvantage of the configuration. Consider a twin-engine tractor aircraft, approaching for a landing at full power, with angle of attack high and flaps down. If one engine should cut out, the resulting unsymmetrical lift would produce a tremendous rolling moment.

In practice, this could be handled with automatic devices to cut power on one engine simultaneously with failure of the other. Then the plane would not have a much lower lift coefficient than any conventional craft with power off and flaps down. The landing could be continued, or the airplane could be retrimmed for level flight and flown out of the approach on one engine.

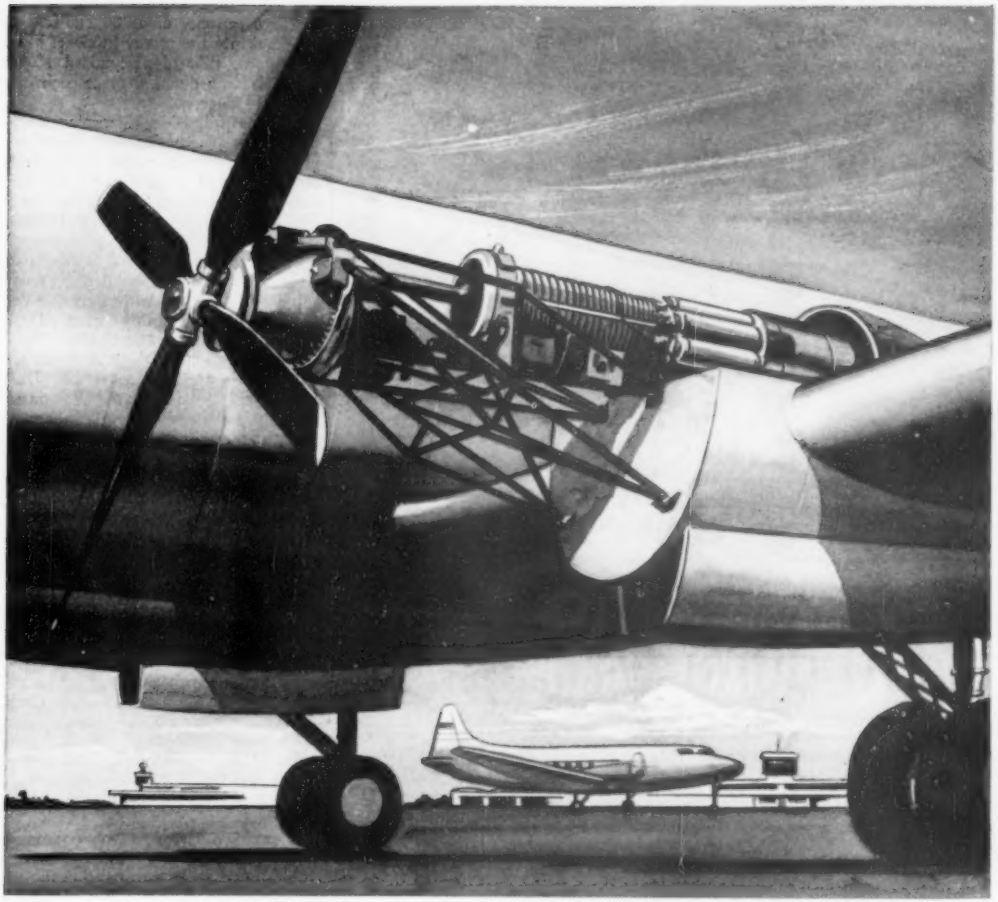
► **Design Proposals**—With the theory and test data in, Pardel put forward a few interesting design proposals calculated to make engineers look long and hard.

Pardel began on a modest scale by suggesting a layout for an airplane designed around the load capacity of a standard Chevrolet 1½-ton pickup truck. Further design criteria included rear-door loading and a floor at the 42-in. height of the truck bed.

The resulting proposal was a design with about a 41-ft. wingspan, slightly smaller than the Beech Twin Bonanza. The plane grossed under 10,000 lb. and carried 3,300 lb. of cargo. Power came from two 400-hp. Lycoming engines. Estimated 60%-power cruise speed was 200 mph.; landing speed, 54 mph.; takeoff distance, 362 ft. Initial rate of climb was calculated to be just under 1,200 fpm. at a climb speed of 180 mph.

► **Twin Transport**—There was also a proposed twin to the airtruck—a short-haul transport. It was to gross under 8,000 lb. and carry 10 passengers. With the same Lycoming engines, it would cruise at the same 200 mph. Landing speed was reduced (because of the weight difference) to 45 mph. Takeoff distance was to be 252 ft.

A third design proposal was made, scaling the wing configuration up to the point where it would support a cargo plane with a nominal capacity of 20 tons. Wingspan of this craft would be 61 ft., which compares, for example, with that of the Northrop F-89 Scorpion



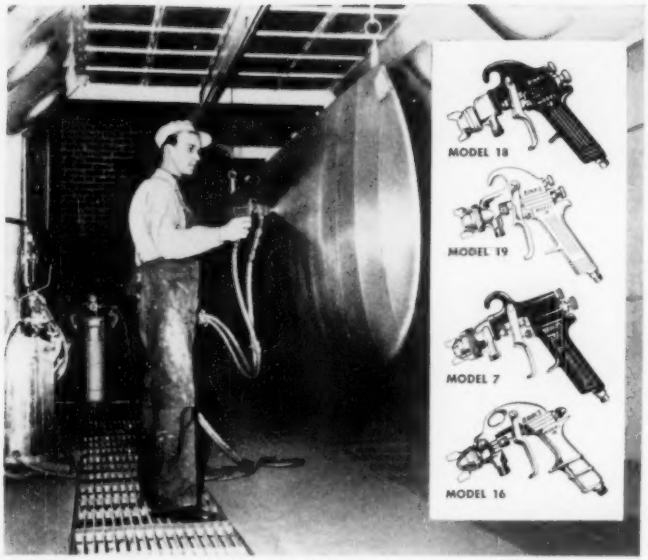
Aircraft Tubing has a Heavy Responsibility

From the time the Wright brothers made their first attempt at flight to the present day turbo-jet transports and bombers, steel tubing has quietly played its important role in all planes. Engineers and all others concerned with the production of aircraft agree that when strength, dependability and lightness are a factor they look to steel tubing to do the job.

For engine mounts, hydraulic lines, landing gear, and a multitude of other components, nothing has the strength and reliability of steel. When you have a heavy responsibility in your aircraft parts, look to steel tubing.

When a dependable source of supply is needed, look to Service Steel for your requirements—whether large or small—from warehouse or mill—your orders are shipped when you want them. Write, phone, or wire for our latest stock list.

SERVICE STEEL *Div.* **1437 FRANKLIN ST., DETROIT 7, MICH.**
VAN PELT CORP. **2440 HUNTER ST., LOS ANGELES, CALIF.**



Production set-up for spraying dope with Binks equipment. Note pressure tank in background that supplies dope by means of air pressure.

SPRAY GUNS for every aircraft painting job

Maybe your need involves the application of dope, lacquer, synthetic enamel, phenolic resins or some special finish or coating for aircraft. Whatever the job, if it involves a sprayable material, Binks has a gun for it...more than 36 models with some 1050 nozzle combinations. Here are the four leaders for aircraft applications:

Model 18—a precision gun for applying finishes at the lowest cost. The highest-quality gun in the line.

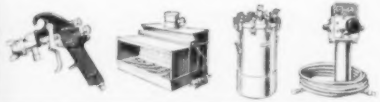
Model 19—a remarkable lightweight production spray gun, using same nozzles as Model 18 spray gun.

Model 7—a heavy-duty production gun. This is a long-time favorite.

Model 16—a lightweight gun for fine finishing, feather edging and blending. A favorite with women operators.

Hiring or training spray gun operators?
Send for this FREE booklet of painting tips!
Here's a pocket-size guide to overcoming common troubles in spraying. Trouble and remedy are described in simple, easy-to-understand terms. A valuable aid to foremen, supervisors, instructors in aircraft plants, sub-contracting plants, Navy and Marine O&R shops, Air Force Field Maintenance and Depot Maintenance Shops, etc. As many copies as you need FREE. Write for "SPRAY PAINTING HINTS" to:
Binks Manufacturing Company
3116-30 Carroll Ave., West, Chicago 12, Ill.

Binks
EVERYTHING FOR SPRAY PAINTING



GUNS • SPRAY BOOTHS • MATERIAL TANKS • EXTRACTORS & ACCESSORIES

REPRESENTATIVES IN PRINCIPAL U. S. & CANADIAN CITIES • SEE YOUR CLASSIFIED DIRECTORY

or the Martin B-57A Canberra.

Cargo capacity of 2,700 cu. ft. was designed into the roomy fuselage. Floor height was that of a standard 10-ton truck; loading doors were at each end of the fuselage.

► **Future Applications**—There are many possible design applications of an airplane geometry which can show a wide range of speed, ability to fly low and slow, and which offers fuselage compactness and high utilization of volume.

Freight-carrying and passenger haulage have been considered. Other uses would include military liaison, troop supply, wire-laying. Anti-submarine versions promise advantages over all the current types being considered.

This is not to suggest that the sky will soon be full of aircraft with Duo-Mono wings, especially when considered against the backdrop of either jet propulsion or supersonic speed.

But for efficient weight-carrying into and out of rugged terrain (Korea, for instance) and for the patrol-observation-destruction duties of anti-submarine campaigns, the Duo-Mono will undoubtedly find increasing employment.

THRUST & DRAG

Fifteen scientists are waiting in the "ice box" at Lockheed Aircraft Corp. for security clearances so that they may work on the company's classified projects. These men—foreign to the United States—are specialists from eight countries, currently "on ice" until cleared. Among them:

• Alex MacLennan, a Scot from the Royal Aircraft Establishment and best known as co-inventor of the explosion-suppressor for aircraft fuel tanks.

• Kenneth E. Watson, British designer responsible for the complete empennage of the de Havilland Comet.

• J. F. McDonald, who was chief technical officer for BOAC.

• W. Garrow-Fisher, who came from Bristol Aeroplane Co. where he was deputy design administration engineer.

* * *

Maxwell's Demon may someday be reading the true air temperature of highspeed planes, when experimental research on the peculiarities of the vortex tube is completed.

The Demon is a device which splits an air stream into hot and cold. It is simply a straight tube with an orifice near one end, a nozzle which directs air in tangentially to the inner surface of the tube, and a throttle at the other end of the tube. When compressed air rushes in the nozzle, warmer air leaves at the throttle and colder air leaves the orifice.

There are several disagreeing theories

which attempt to explain how the thing works; Maxwell's name unfortunately got connected with a demon who was supposed to sit at a gate and sort out the molecules of air as they entered the tube. Be that as it may, the gadget works, and it has some applications for aircraft.

Recent research at Cornell Aeronautical Laboratory and at Armour Research Foundation has been directed to making the Demon a true air temperature thermometer. Reasoning behind this is that stagnation temperatures read by conventional methods include considerable aerodynamic heating effects. But if you take the same ram air which raises the stagnation temperature and run it into a Demon, it will come out both hotter and colder than where it entered. So it must be possible to measure a temperature somewhere in the cool side where the rise due to aerodynamic heating is just equal to the drop caused by the cooling. And that spot is where you read the true outside air temperature.

* * *

The flying test-bed to end all flying test-beds is now operating from the Armstrong Siddeley field near Coventry, England. It started life as an Avro Lancaster bomber with four Rolls-Royce Merlin piston engines. Then AS installed a Mamba turboprop engine in the nose. Recently they have placed an Adder turbojet in the tail where the gunner used to ride.

* * *

Know what happens to a carbon brush operating in the stratosphere? A brush which may last for months at ground level wears at the rate of a half-inch per hour or greater. One solution is to supply moisture for lubrication, but British scientists investigating the problem for a specific heavy jet bomber found that it would require about 600 lb. of water. So they have developed alternate (and unspecified) techniques. Another peculiarity of high-altitude flight discovered by the British is that the exhaled breath of the fliers is highly corrosive on interior metal surfaces. This means extra paint, or other protective coatings, inside the plane—which means more weight.

* * *

Structural sandwich construction—which sounds like something out of Dagwood—was the topic of a symposium held in June, 1951, by the American Society for Testing Materials. Eight significant papers and discussions presented at this annual meeting have been collected by the ASTM in its publication STP No. 118, which can be obtained from the Society, 1916 Race Street, Philadelphia 3, for $2.—DAA

AEROTEC AUTOMATIC CONTROLS

Boeing Transport

Prove dependable in combat and transport operations

An Aerotec Dual Float Switch Top Mounted

Republic, Boeing, and other leading aircraft manufacturers are using many types of Aerotec Automatic Controls in increasing numbers. These controls are custom designed and built to meet specific problems of high speed and high altitude flight in today's aircraft. Each Aerotec automatic device passes rigid tests duplicating actual flight conditions to assure its efficiency and dependability.

The planes shown above are typical designs that incorporate Aerotec Automatic Controls. The Republic F-84F Thunderjet, a combat-proven craft, uses Aerotec pressure switches and a new dual float switch suitable for tip or pylon mounted auxiliary fuel tanks. Boeing has long used Aerotec valves, float switches, and pressure switches on their famous planes.

When you are faced with problems of automatic controls for flaps, landing gear and cabin heater applications, fuel transfer, flow indication, etc., contact Aerotec. One of our instrumentation specialists is near you, ready to give prompt and able assistance at any time. Call or write.

. . . for AEROTEC controls *custom-built to your needs* contact THERMIX

AIRCRAFT REPRESENTATIVES

CLEVELAND 29, OHIO — Jay Engineering Co. 5413 Pearl Rd.
NORWALK, CONN. — John S. Hammond P.O. Box 775
ROSLYN HEIGHTS, L.I., N.Y. — John S. Hammond 25 Edwards St.
DAYTON 3, OHIO — Jay Engineering Co. 1517 East 3rd Street
LOS ANGELES 43, CAL. — Forsnas Engr. Co. 4545 West 62nd St.
SEATTLE 1, WASH. — John E. Freeman & Assoc. 1529-9th St.
WICHITA 3, KANSAS — John E. Freeman & Assoc. 4913 East Lewis Street

Project Engineers

THE THERMIX CORPORATION

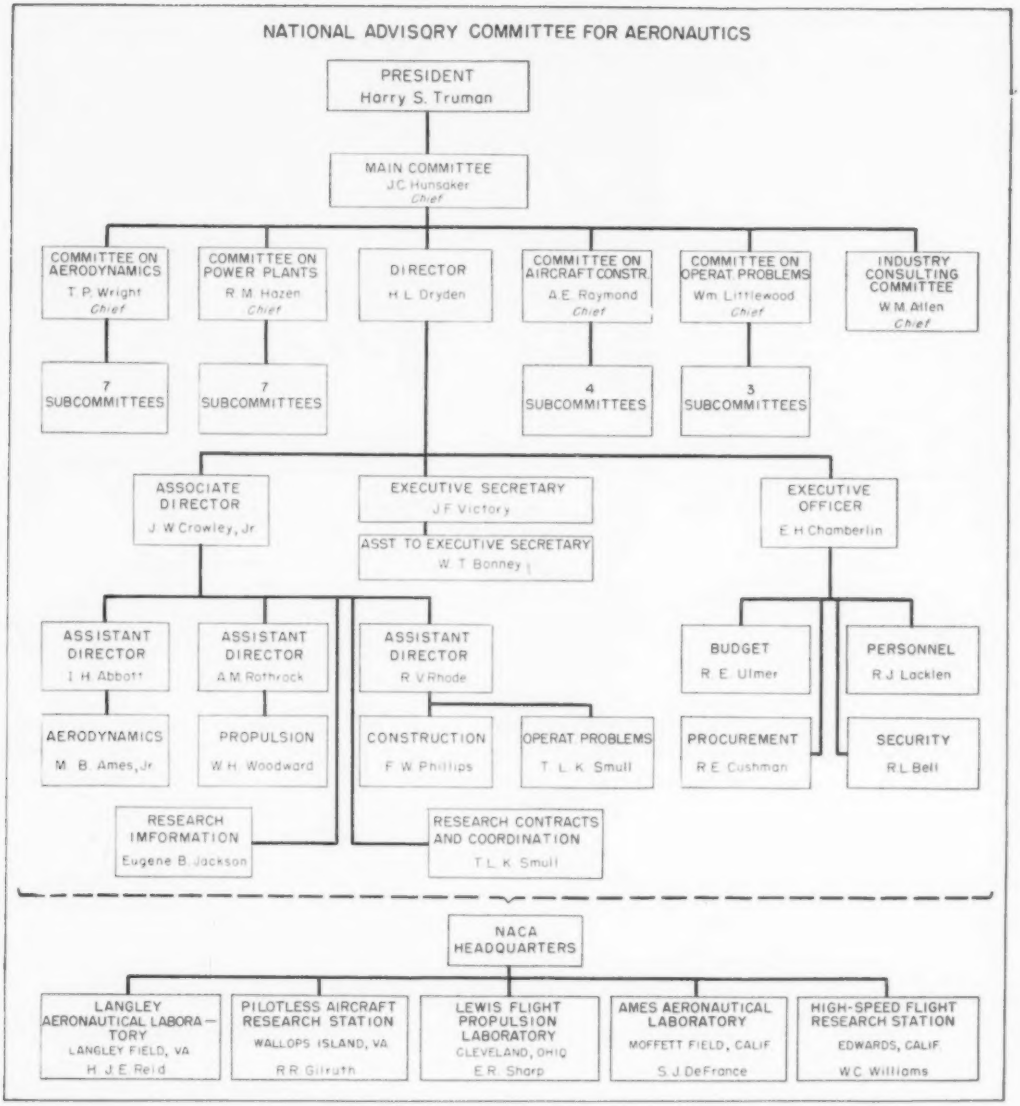
GREENWICH, CONNECTICUT

Canadian Affiliates: T. C. CHOWN, LTD.
1440 St. Catherine St. W., Montreal 25, Quebec • 50 Abell St., Toronto 3, Ontario

THE AEROTEC CORPORATION

AIRCRAFT DIVISION — GREENWICH, CONNECTICUT

Designers and Manufacturers of Automatic Controls—*Valves:* Regulating, Relief and Check types—*Pressure Switches:* Gage, Altitude, Differential and Absolute Types—*Float Switches:* Top, bottom or side mounted—Single, Dual, or Tandem.



NACA Names Technical Committee Heads

Announcement of membership appointments to the five major technical committees and 21 subcommittees of the National Advisory Committee for Aeronautics has been made by Dr. J. C. Hunsaker, NACA chairman.

About 400 scientists, engineers and experts from universities, industry, government and airlines have been named. These appointees serve without compensation in a personal and professional capacity.

Their function is to provide material assistance in the formulation of research programs for the NACA. The subcommittee members meet regularly to consider problems of their particular fields, to review research in progress at NACA and other laboratories, to recommend research projects and to assist in the coordination of research programs.

Chairmen of the NACA's five major technical committees for the current year are:

- **Aerodynamics,** Dr. Theodore P. Wright, vice president for research, Cornell University.
- **Powerplants for Aircraft,** Ronald M. Hazen, director of engineering, Allison division, General Motors Corp.
- **Aircraft Construction,** Dr. Arthur E. Raymond, vice president, engineering,

Now Flying—The F7U-3 Cutlass

The F7U-3 Cutlass, designed by Chance Vought Aircraft's engineers to outfly or out-fight any other carrier-based fighter in the world, has made its initial flight.

The twin-jet F7U-3 is larger but similar in appearance to the F7U-1. It promises to be an even more formidable weapon for the Navy's carrier-borne arsenal than its predecessor, the first swept wing, tailless fighter to fly from a flat-top.

The new version is being produced to give the U. S. Fleet a fighter with superior high-altitude performance, greater range, greater rate of climb, exceptional maneuverability and the firepower to deliver deadly blows in combat.

Chance Vought Aircraft . DALLAS, TEXAS

ONE OF THE FOUR DIVISIONS OF UNITED AIRCRAFT CORPORATION

Announcing a move of importance to airframe and aviation engine manufacturers

To keep pace with expanding aircraft production and to provide the industry with a second source for Whittaker designed valves . . .

THE WM. R. WHITTAKER CO., Ltd.
HAS LICENSED
Robertshaw-Fulton
CONTROLS COMPANY
TO MANUFACTURE WHITTAKER VALVES

Under this licensing arrangement the manufacturing facilities of two highly skilled suppliers are combined to meet defense requirements. Robertshaw-Fulton will produce Whittaker valves in its Anaheim, Calif. plant. Service will be through the Whittaker Field Engineering staff with offices in Los Angeles, Seattle, Wichita, Indianapolis, Baltimore, New York City and Montreal, Canada.

Whittaker

WM. R. WHITTAKER CO., Ltd.
915 N. CITRUS • LOS ANGELES 38, CALIFORNIA

Nation's No. 1 producer of aircraft valves

Douglas Aircraft Co., Inc.

• **Operating Problems,** William Littlewood, vice president, engineering, American Airlines, Inc.

• **Industry Consulting Committee,** William M. Allen, president, Boeing Airplane Co.

The 1952 chairmen of the 21 subcommittees are:

• **Fluid Mechanics,** Dr. Clark B. Millikan, director, Daniel Guggenheim Aeronautical Laboratory, California Institute of Technology.

• **Highspeed Aerodynamics,** Dr. Allen E. Puckett, head, Missile Aerodynamics section, Department of Electronics and Guided Missiles, Hughes Aircraft Co.

• **Stability and Control,** Captain Walter S. Diehl, USN (Ret.), Washington, D. C.

• **Internal Flow,** Philip A. Colman, chief aerodynamics engineer, Lockheed Aircraft Corp.

• **Propellers for Aircraft,** Thomas B. Rhines, assistant chief engineer, Hamilton Standard division, United Aircraft Corp.

• **Seaplanes,** Grover Loening, Washington, D. C.

• **Helicopters,** Bartram Kelley, chief engineer, Helicopter division, Bell Aircraft Corp.

• **Aircraft Fuels,** Dr. J. Bennett Hill director, Chemical and Engineering division, Research and Development Dept., Sun Oil Co.

• **Combustion,** Dr. John P. Longwell, Esso Laboratories, Process division, Standard Oil Development Co.

• **Lubrication and Wear,** E. M. Phillips, Aircraft Gas Turbine division, General Electric Co.

• **Compressors and Turbines,** Prof. Howard W. Emmons, Harvard University.

• **Engine Performance and Operation,** Arnold H. Redding, Flow Research section, Aviation Gas Turbine division, Westinghouse Electric Corp.

• **Heat-Resisting Materials,** Arthur W. F. Green, chief metallurgist, Allison division, General Motors Corp.

• **Rocket Engines,** Dr. Maurice J. Zucrow, professor of jet propulsion, School of Mechanical Engineering, Purdue University.

• **Aircraft Structures,** Charles R. Strang, Douglas Aircraft Co., Inc.

• **Aircraft Loads,** Jerome F. McBrearty, division engineer, structural engineering, Lockheed Aircraft Corp.

• **Vibration and Flutter,** Martin Goland, associate director for engineering, Midwest Research Institute.

• **Aircraft Structural Materials,** Edgar H. Dix, Jr., assistant director of research, Aluminum Research Laboratories, Aluminum Company of America.

• **Meteorological Problems,** Dr. F. W. Reichelderfer, chief, U. S. Weather Bureau.

• **Icing Problems,** Arthur A. Brown, Installation Engineering Laboratory, Pratt and Whitney Aircraft, United Aircraft Corp.

• **Aircraft Fire Prevention,** Raymond D. Kelly, superintendent of technical development, United Air Lines, Inc.

Try AERO SPARES CO.

wholesale distributors
to the
AIRCRAFT INDUSTRY—

AN 500 thru AN 565 screws
in Steel, Brass and
Stainless Steel
An 310 thru 373 nuts
AN washers and grommets

AERO SPARES CO.
37-53 90th Street
Jackson Heights, New York

FOR MAXIMUM JET POWER

Stainless steel nozzle assemblies for jet aircraft engines. ABOVE: nozzle tip assembly. ABOVE, RIGHT: duplex nozzle assembly. TO RIGHT: dual flow nozzle assembly. All details of these units have been manufactured and assembled by Ex-Cell-O to the rigid specifications of the aircraft industry.

Ex-Cell-O Precision Parts

XLO

Working in stainless steel to customers' rigid specifications, Ex-Cell-O is actively engaged in production of jet aircraft nozzle assemblies. This is but one of the latest developments in a long-standing program of service to the aviation industry. The result: engine, propeller, or fuselage of practically every plane produced in this country has parts made by Ex-Cell-O or finished on Ex-Cell-O precision machines. Such wide acceptance speaks well for Ex-Cell-O quality.

Ex-Cell-O has complete parts production facilities, including rough and finish machining, heat treating, and metallurgical control, all done directly under one responsible management. All these facilities are being utilized by the aircraft industry in its rapid progress in commercial and military air power.

Below: Some typical precision aircraft parts manufactured by Ex-Cell-O to customers' specifications.

51-7

EX-CELL-O CORPORATION Detroit 32, Michigan

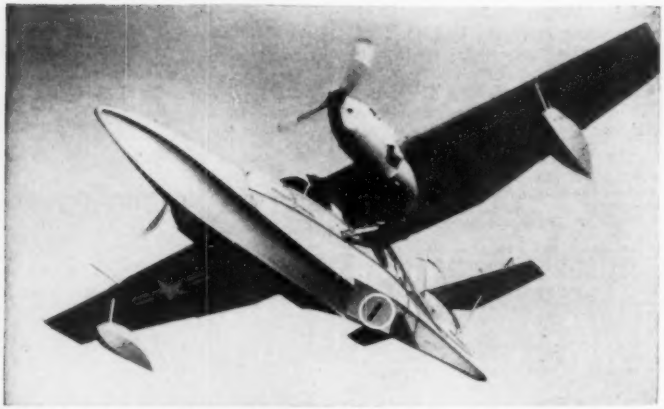
Always
SWIVEL
and
ROLL
Extra Value
ANY WAY YOU MEASURE IT

DARNELL

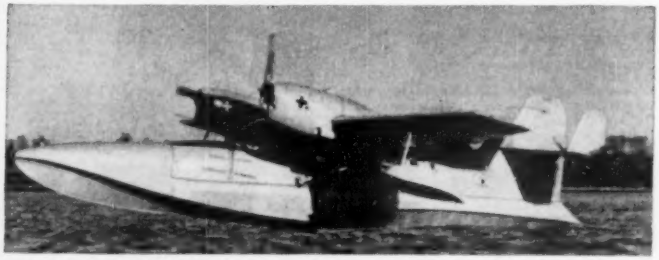
• Save Money, Floors, Equipment and Time by using DARNELL Casters and Wheels . . . Always dependable, these low-cost floor protection products have been made to give you a long life of efficient, trouble-free service.

FREE MANUAL.

DARNELL CORP. LTD.
Long Beach 4, Calif.
60 Walker St., New York 13, N. Y.
36 N. Clinton, Chicago 6, Ill.



EDO J4F-2 tries its sixth hull. Window (circled) is used to check water flow as . . .



PETULANT PORPOISE lands. Edo modified a standard Grumman Widgeon for tests.

Seaplane Sports Quick-Change Hull

Edo tests on modified Widgeon indicate continued trend toward high length-to-beam ratios for flying boats.

Tomorrow's flying boat hulls, being tested in scaled-down versions on the Navy's "Petulant Porpoise," will probably continue the trend toward higher ratios of length to beam.

The Petulant Porpoise, modified by Edo Corp. from a standard Grumman J4F-2 Widgeon, is now flight- and water-testing a hull with a length-beam ratio of 12.5, highest ever used.

Such high ratios help in reducing the flying boat's drag in the air and on the water; they cut down the amount of spray, handle better on the surface during rough water conditions and waste less hull volume.

▶ **Development**—The tendency to higher ratios of length to beam has been showing since the early days of the Consolidated PBY boats. These had a hull only five times as long as it was wide. Martin's first PBM raised this ratio to six to one, and the later P5M series went to 8.5 to one.

Navy's latest boat, the Convair P5Y, ran the ratio up to ten to one, continuing the trend. Now this new hull has been designed by Navy's BuAer and Convair for the larger flying boats contemplated for the future.

But the use of high length-beam ratio hulls had to wait on the development of bottom shapes. Water-handling characteristics, without these new shapes, were rather bad. The use of the elongated after-body (that portion of the hull aft of the main step) was one important step forward in perfecting the current hull design.

▶ **Quick Change**—The Petulant Porpoise is now sporting its sixth new hull. As a test vehicle, this converted Widgeon is unique. Five years ago, Edo engineers adapted the Grumman design so that hull bottoms could be mounted and dismounted without much more trouble than changing wings.

The purpose was to get a flyable hull whose handling characteristics could be determined by water and flight tests—these characteristics cannot be obtained from tow tank tests.

The test hull now flying has a pair of windows in its bottom for visual and

New Giant of the Air Force

This is the Boeing eight-jet XB-52 Stratofortress, America's new all-jet heavy bomber – one of the most potent weapons yet devised to keep peace through strategic air power.

Details of the B-52's design and performance are closely guarded secrets. This non-revealing photo was released by the Air Force when the airplane was moved from its hangar to a more exposed area for start of engine and taxi tests. Boeing will continue, with the Air Force, the policy of guarding details of the B-52 to the fullest extent.

This mighty bomber climaxes 35 years of Boeing development. Like its teammate, the B-47 Stratojet medium bomber, it has behind it the accumulated skills that gave the nation the B-17 Flying Fortress and the B-29 and B-50 Superforts. It represents daring thinking and ingenuity on the part of both Boeing's experienced engineering staff and the United States Air Force.

The B-52 Stratofortress – already ordered for production – is evidence of America's determination to maintain necessary strategic air strength.

For the Air Force, Boeing also builds the B-47 Stratojets, TB-50 Superfortresses and C-97 Stratofreighters; and for the world's leading airlines Boeing has built fleets of twin-deck Stratocruisers.

BOEING

On tough sealing jobs like this...

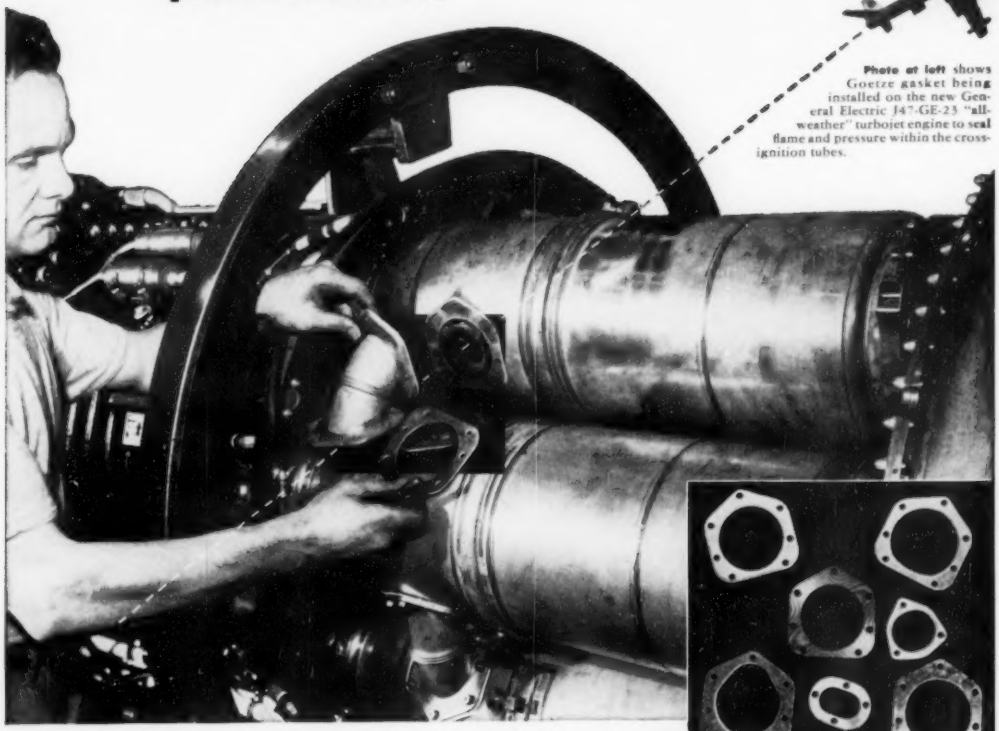
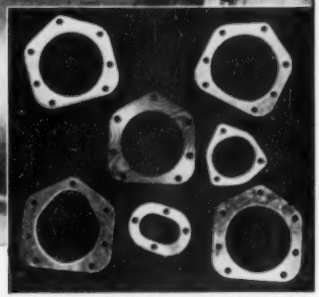


Photo at left shows Goetze gasket being installed on the new General Electric J47-GE-23 "all-weather" turbojet engine to seal flame and pressure within the cross-ignition tubes.



J-M Goetze Gaskets can be fabricated in any shape for sealing cross-ignition tube connections. A few examples are shown here.

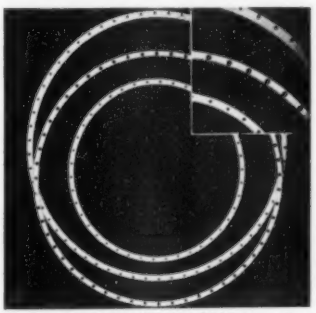
J-M Goetze Gaskets guard against critical flame and pressure leakage

Keeping flame and pressure from leaking where cross-ignition tubes connect combustion cans on the new J47-GE-23 "all-weather" turbojet engine is a typical example of the difficult and critical sealing problems that are solved with Goetze custom-crafted metallic gaskets.

The particular Goetze style used for this job is a metal-jacketed asbestos gasket, precision-made to fit tight and stay tight in service. It withstands temperatures to 850F and all operating pressures normally encountered in this type of service. Its flexibility protects against vibration, expansion and contraction.

Like all Goetze gaskets, this style is backed by more than 60 years of Goetze "know-how" that has solved many of industry's most complex sealing problems with gaskets of every design, shape, and size. And it is made on the same modern machines that enable Goetze craftsmen to fill every order with remarkable promptness.

For further information about Johns-Manville Goetze gaskets . . . and other J-M products for the aviation industry . . . write for Brochure AV-1A. Address Johns-Manville, Box 60, New York 16, New York. In Canada, write 199 Bay Street, Toronto 1, Ontario.



For turbine casing flanges J-M Goetze Gaskets provide the resilience required to overcome warpage usually encountered.

JOHNS MANVILLE JM PRODUCTS **Johns-Manville** PRODUCTS for the AVIATION INDUSTRY

photographic observation of the flow at and aft of the step. This technique was introduced on the sixth hull of the Porpoise.

▶**Value of Tests**—The first hull tested by Edo Corp. on the Porpoise was a scale model of the Martin P5M configuration, about half-size. The handling characteristics of the model hull and its performance data were almost exactly duplicated later in testing the P5M.

A few conditions of instability in the model tests did not match the full scale tests; but these actually turned out to be less severe on the full-size hull than on the model. The difference can be attributed to the effect of scale on certain kinds of handling characteristics. Instabilities were either damped out completely, or slower in cycle on the large hull.

Edo says that considerable research time and money have been saved by these scaled-down hull tests. One hull went through a four-month test period at the Naval Air Test Center, Patuxent, Md. During that time, the hull configuration was changed six times. These changes were of serious nature and would have taken weeks to make on the full-scale flying prototype.

NACA Report

Turboprop Design

▶**Method of Matching Components and Predicting Performance of a Turbine-Propeller Engine (TN 2450)—By Alois T. Sutor and Morris A. Zipkin.**

Once you design a turbine-propeller engine, you can calculate the overall thermodynamic cycle. But to design the engine, you need to know the overall thermodynamic cycle. Therefore, one place to start is with a component whose characteristics are known, and this is generally the compressor.

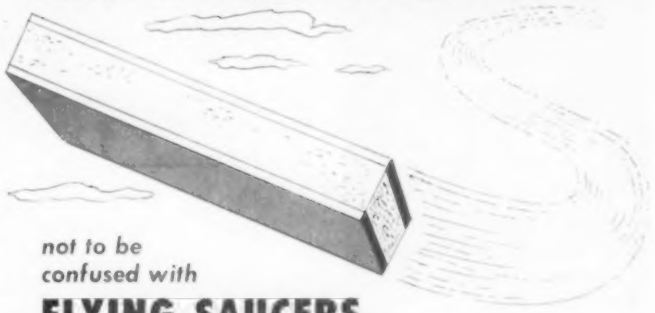
Then the remainder of the design problem is matching turbine and exhaust nozzle to the compressor characteristics.

The authors, scientists at Lewis Flight Propulsion Laboratory of the NACA, present a simplified systematic method which shows some of the compromises which are necessary to select the turbine.

Result of this component matching may be used to predict the power per unit size of the engine. And when the engine power is found, the absolute size of each component can be fixed and determined from the results of the earlier matching.

The method of analysis also enables the engine designer to predict the performance of the overall engine including some of its practical limitations, such as compressor surge and maximum turbine pressure ratio.

THE FLYING SANDWICH



not to be confused with

FLYING SAUCERS

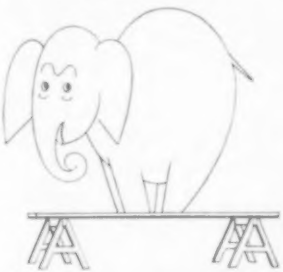
It's not a hallucination of ours but a product of ours that is flying high in the aircraft industry because of its unusual strength-weight ratio.

It's not a secret weapon but a special Russell form of sandwich construction which comprises:

A. REPCO PANELS for the skins
These panels, lighter than aluminum and strong as steel, are of low pressure reinforced laminates of Fiberglas, nylon or other modern materials in sizes up to 4 x 9 feet, in thicknesses up to ½".

B. STRUX (CCA) as the core
This expanded plastic (cellular cellulose acetate), produced under duPont license, has a high strength-weight ratio, good dielectric qualities, and may be subjected to temperatures up to 350° F. for long periods.

As a sandwich, these two products form an unbeatable combination. Individually, Repco Panels are used for aircraft backing board and cargo liners . . . Strux as gun plugs for jet fighters.



We also produce hundreds of aircraft parts made of REPCO PLASTICS by the matched die and vacuum bag molding processes . . . and as fabricators of laminated phenolics, wood, nylon and melamine products.

Write for data and samples

Repco Plastics *by Russell*

REINFORCED PLASTICS CORP.

TWO SOUTH 13th STREET • LINDENHURST, L.I., N.Y.

Associated Companies	STRUX CORPORATION	*Lindenhurst, L.I., N.Y.*
	AIRCRAFT SPECIALTIES CO., INC.	*Hicksville, L.I., N.Y.*
West Coast Representative	REGAL PLASTIC COMPANY	*Kansas City 6, Missouri*
	ALLIED PRODUCTS ENGINEERING CO.	*Los Angeles 43, California*
Distributor	WESTERN FIBERGLAS SUPPLY CO.	*Los Angeles 13, California*

Clearly the Best way to clean a windshield...

WHIZ "C"

WINDSHIELD CLEANER

Here's Why "C" is BEST

1 NON-CRAZING—Can be used on glass or any plastic—contains no harmful solvents. Will not craze or cloud.

2 WORKS FAST—Quickly removes oil spatter, grime and bug juice.

3 EASY TO APPLY AND REMOVE—Leaves surface clear—free of dust or film.

4 NOT ABRASIVE—Cannot scratch or dull window surfaces.

5 NON-INFLAMMABLE, NON-TOXIC—"C" is safe to use—safe to store!

"C" is a quality WHIZ product—made by the world's largest manufacturer of quality maintenance products.

Ask your supplier for

WHIZ "C"

WINDSHIELD CLEANER

CLEARLY THE BEST

Whiz

Available in pints and gallons

Industrial-Aviation Division

R. M. HOLLINGSHEAD CORP.

Leader in Maintenance Chemicals

Camden 3, N. J. Canadian Offices: Toronto

FINANCIAL

Big Four Earnings—1950-1951

	AMERICAN	EASTERN	TWA	UNITED
	(000 omitted)			
Operating Revenues				
1951	$162,971	$98,301	$144,912	$127,798
1950	118,685	78,490	116,966	104,095
Increase	37.4%	25.3%	23.9%	22.6%
Operating Expenses				
1951	132,859	78,365	126,444	109,271
1950	95,437	69,101	105,506	91,466
Increase	39.2%	13.4%	19.8%	19.5%
Net Operating Income				
1951	30,022	19,936	18,468	18,527
1950	23,248	9,389	11,460	12,629
Increase	29.1%	112.0%	61.2%	46.6%
Federal Income Taxes				
1951	17,400	13,500	8,449	8,906
1950	11,400	4,600	1,840	5,396
Increase	52.7%	193.5%	360.1%	65.2%
Net Income				
1951	10,549	7,232	8,511	8,563
1950	10,400	5,258	7,830	6,430
Increase	1.4%	37.6%	8.7%	33.2%

Rising Costs Race Big Four Income

Major trunklines report that climbing income taxes and other expenses largely nullify impressive revenue gains.

Substantial gains in revenues and net income during 1951 for the Big Four are evident in the individual annual reports released for these carriers. Significant variations are present, however, due to the impact of rising costs and higher taxes. This can be seen from the summary of results in the accompanying table.

In terms of total gross revenues, American leads the group in dollar volume as well as rate of gain. Its increase of 37.4% over 1950 compares with a rate of increase of 23.9% for TWA, 25.3% for Eastern and 22.6% for United. All of these gains realized were due to the substantial increases in passenger revenues.

Despite the material rise in volume of mail handled, revenue from this source was down, with one exception. For example, American showed a 51% increase in mail ton miles, but its revenues from this activity increased only 17.2%. This reflected the reduction in mail pay to 45 cents a ton mile established last year for the domestic operations of the Big Four.

▶ **Expenses Rise**—While total revenues increased, operating expenses were also on the march. Eastern appears to have had its expenses under relatively better control—this category increased only 13.4%. A depreciation adjustment was a factor in this showing, but does not change the relative performance of the group.

Federal income taxes were particularly hurtful and nullified much of the gains recorded in operating income. Two carriers, American and Eastern, paid excess profits taxes last year. Eastern's excess profits tax was $2,700,000; American's $2,550,000.

It is noteworthy that American and Eastern also paid total taxes higher by 65% and 87% respectively, than their reported net income last year. For TWA and United, total taxes approximated their respective reported net income. With the exception of TWA, total income taxes paid were in excess of the total mail pay received at the new compensatory service rates.

The impact of taxes was a major influence in determining the net income reported by the separate carriers. United, in the final analysis, showed the greatest percentage of gain, 33.2%, by retaining a greater share of its earnings. The company was not required to pay any excess profits taxes last year, being subject to only normal and surtax imposts.

▶ **Accounting Angles**—In all instances, special accounting qualifications are present and temper the reported final results.

American adopted a policy in 1951 of charging to that year the cost of vaca-

WICKWIRE

AIRCRAFT CONTROL CABLE

Immediately Available

THROUGH AIR ASSOCIATES

Nine warehouses strategically spotted from coast to coast are maintained for convenient deliveries. This means that supplies of Wickwire Aircraft Control Cable are always immediately available . . . within easy and economical shipping distance.

Air Associates, Inc. maintains full stocks of Wickwire Aircraft Control Cable in their own and C F & I warehouses in all sizes and constructions for auxiliary and main controls on all types of planes. Next time you need control cable, specify Wickwire for utmost safety and long-lasting reliability.

Write or call the nearest branch warehouse of Air Associates for prompt attention to your particular needs.

LOOK FOR THE YELLOW TRIANGLE ON THE REEL

DISTRIBUTED BY

Air Associates

AIR ASSOCIATES INC

TETERBORO — 216-222 Union St., Hackensack, N. J.
CHICAGO — 5315 West 63rd Street
DALLAS — 3214 Love Field Drive
GLENDALE — 1231 Air Way
MIAMI — P.O. Box 241, Int'l Airport

loss earned during the year but to be taken in 1952. This resulted in additional charges of $2,243,000, which after tax adjustments meant a reduction in net income of $1,185,000.

The company also revised the method of funding the service cost of the retirement benefit plan through an increase of $991,000 in contributions for 1951. After tax adjustments, this meant a further reduction in net income of $342,000. This revision does not affect employes' benefits. It merely serves to accelerate the company's contributions over the near future but automatically reduces the amount of payments due in later years.

These two major adjustments, account for the very nominal increase in net income recorded by American for 1951 and were partly responsible for the company's showing the smallest gain among the Big Four.

► **TWA's Flood**—TWA reveals an interesting adjustment in handling the losses resulting from the flood which hit its Kansas City base in July, 1951. Appearing as a deferred charge for the first time is a Flood Clearing Account in the net amount of $2,356,003. This represents the net cost or book value of engine parts, aircraft parts and other properties lost or damaged in the flood after $2,500,000 had been received from the insurers against recoverable loss.

In addition, the company provided a reserve of $2,000,000 against aggregate uninsured loss by a charge against current operations to Ground and Indirect Maintenance. In other words, 1951 gross earnings were reduced by this amount. This reserve was reduced by $662,940 last year, representing the amount of the losses, damages and rehabilitation costs sustained that appeared to be irrecoverable from the insurers. The total direct flood loss stands at more than $5.5 million.

► **Connie Depreciation**—A significant adjustment appears in Eastern's depreciation charges. Effective Jan. 1, 1951, the company extended by one year its estimated life of the Constellation airplanes and engines for book purposes. This meant using a five-year base instead of the four-year period previously employed, and compares with the seven-year span applied by other Constellation operators.

It appears that this adjustment was necessary as this equipment was beginning to be written off the books. By mid-1951, 13 of the Constellations would have been written down to a residual value of $10,000 each if this adjustment had not been made. This change also took place, for tax purposes, retroactive to Jan. 1, 1948. This meant that depreciation charges for 1951 were reduced by about $1 million while the provision for federal income taxes, due to the retroactive nature, increased to $1,200,000.

Further adjustments for this year are evident in the Eastern accounts due to past conservative accounting policies. For example, it is noted that aircraft and related equipment having an original cost of $11.6 million has been written down to a residual value of $470,000 at Dec. 31, 1951. These items include a fleet of 49 DC-3s which are slated for disposition this year. In fact, 20 of these planes have already been sold for an amount estimated well in excess of the residual value for the entire fleet.

Upon disposing of the entire DC-3 fleet, some $980,000 appearing in the Reserve for Provision of Overhaul at Dec. 31, 1951 will no longer be required and presumably returned to surplus. While Eastern's depreciation policy may have been altered slightly, the company's basic conservative financial and accounting practices remain.

The annual results disguise strong tendencies of rising costs which have developed during the second half of last year. Without exception, all of the airlines in the Big Four note this condition and point to the necessity of obtaining remedial action through adjustments in the fare structure.

—Selig Altschul

Only TAC has
perfected and produced
the open-end
ratchet
wrench!
Left: Crowfoot Type
Right: Socket Type
Four series of sockets cover 64 sizes from 3/4" to 4". Crowfoot (fixed type) wrenches are also produced. All Details of our tools are protected by Patent numbers 2578686 and 2578687. Other Patents pending.
WRENCHING OPERATIONS on tubing, within aircraft assemblies where space is restricted, was a bottleneck before the TAC Open End Ratchet Wrench was introduced. Today this is the only tool used for certain critical jobs on tubing or other standing center connections.
The TAC will ratchet perfectly using as little as 7° arc. It slips down over tubing, tightens or backs off fittings, slips off again . . . all in a fraction of the time you'd expect.
Our plants are currently producing at capacity for all the Armed Forces and for Defense Industries.
TAC
TUBING APPLIANCE CO.
10321 ANZA AVENUE
Los Angeles, California
©1952 - TAC

Every pound of your aluminum allocation is usable when you buy blanks from...

REYNOLDS FABRICATING SERVICE

Saves an average 30% scrap loss, plus scrap handling

Scrap from shearing and blanking is remelted immediately at Reynolds plants without costly loss of time, segregation and storing, reshipment between cities, or diversion of valuable metal. You can use *all* of the aluminum you receive ... without delay ... without scrap loss. In addition, you realize important savings in handling, storage space, work space and manpower.

Reynolds Aluminum Fabricating Service offers extensive facilities to produce semi-fabricated blanks or completed parts ready for assembly. Quotations on aluminum blanks or parts can be furnished to your drawings and specifications. Technical assistance from aluminum fabricating specialists is available for your problems.

For additional information, write for literature, or call the Reynolds office listed under "Aluminum" in your classified telephone directory. Reynolds Metals Company, Parts Division, 2059 South Ninth Street, Louisville 1, Kentucky.

Reynolds Aluminum Fabricating Facilities

One of the country's most complete facilities for aluminum fabricating includes:

- Over 100 mechanical presses ranging from 5 to 1700 tons.
- Hydraulic presses from 50 to 500 tons.
- Equipment for shearing, blanking, forming, riveting and welding, roll forming, finishing and assembly.

These facilities can assure a steady flow of blanks or fabricated parts to your specifications and production requirements.

BE SURE TO see The Kate Smith Evening Hour every Wednesday, NBC-TV.

REYNOLDS METALS

REYNOLDS ALUMINUM FABRICATING SERVICE

BLANKING • EMBOSSING • STAMPING • DRAWING • RIVETING • FORMING • ROLL SHAPING • TUBE BENDING • WELDING • FINISHING

Here's America's Metal-Working Wonder!

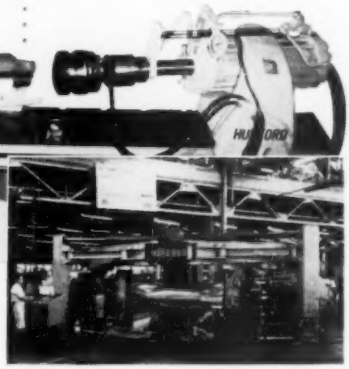


Photo Courtesy: Boeing Airplane Co., Wichita, Kansas

THE HUFFORD STRETCH-WRAP FORMING PRINCIPLE IN 3 QUICK STEPS!

STRETCHED in front of a stationery die, metal becomes semi-plastic.

WRAPPED around die, plasticity aids in molding metal to die contours.

FORMED at end of wrapping stroke, a final stretch permanently "sets" the shape.

It *stretches* metal to form it—*wraps* it around shaped dies to make finished parts faster, more accurately, more economically!

Through HUFFORD engineering and development, industry now has a *better* metal-forming technique. It solves the problem of quick, accurate, uniform production of complex shapes from sheets or extrusions. Production runs can be short or long with full economy and duplicate parts are easily re-run at any subsequent date with minimum effort. Due to the stretching process, metal strength is actually improved.

HUFFORD STRETCH-WRAP FORMING is now applied to aluminum and many of its alloys, various steels, stainless steels, magnesium, etc. The machines, available in stretching capacities from 12 to 350 tons, accurately form both structural parts and sheets for the construction of frame elements and skin surfaces.

Now accepted as the world-wide standard of the aircraft industry, these huge Hufford Stretch-Wrap Forming Machines are just *one of Huffords many contributions to advanced metal-working and manufacturing methods!*

UNUSUAL TOOLING EASE is one feature of the Hufford Stretch-Wrap Forming Process. Simple dies, made from Masonite or other easily worked materials are suitable for contouring extrusions and narrow sheets. Steel facing insures long runs. Kirksite dies cast from plaster molds are most frequently used when forming large sheets. The complicated parts below are typical of those made from relatively simple dies.

If you want to know more about HUFFORD STRETCH-WRAP FORMING, a basic treatise titled "PRINCIPLES OF STRETCH-WRAP FORMING" explains in simple terms the why and how of this new process. A request on your letterhead will bring it.

Evaluation Speeded on Visual Computers

- **Newest models of three firms go to CAA.**
- **Arma's device contains some special features.**

By George L. Christian

Highly accurate, shiny new models of pictorial computers are now reaching the Civil Aeronautics Administration's Technical Development Center, Indianapolis, for evaluation.

▶ **Three in the Ring**—Three manufacturers are supplying five models each for the CAA testing program.

• **Arma Corp.** is busily grooming the first of its five entries for early delivery to Indianapolis.

• **Aero Electronics Co.** has already supplied five models of its portable lap model to Indianapolis and Patuxent, Md.

• **Sperry Gyroscope Co.** has delivered one Model B computer, will send another in April. (Model B designates the Sperry unit incorporating a Course Line Computer. Model A, of which two are on order, consists of a pictorial computer only.) The Sperry instrument uses a stylus to trace plan's progress over a special paper map. A Gyrosyn compass controlled steel needle at the end of the stylus gives heading information.

(All three computers were described in AVIATION WEEK Oct. 23, p. 57.)

▶ **Arma's Entry**—The Arma unit displays the pilot's position by moving the shadow of a "bug" across a specially drawn map projected on a novel daylight-type, see-through screen.

Arma's panel pictorial computer has many interesting features. S. J. Davy, assistant head of Arma's computer engineering department, tells AVIATION WEEK his company is proudest of these details:

• **Complete navigational facilities.** Range, bearing and heading are supplied to the pilot, yet he has but one slewing control to operate. All navigational charts are self-contained in the computer and immediately accessible to the pilot through use of the slewing control handle.

• **Accuracy.** Computer is credited with these tolerances: range ±0.4 mi. at all scales; bearing, ±½ deg. or 1/32 in., whichever is greater; heading, ±1 deg.

• **Versatility.** The screen might be used to give the pilot much information other than that required for navigation alone, although present computer design does not have the apparatus to do so. Davy cited these examples:

Tower instructions to hold at a given altitude could be flashed on the screen by an auxiliary projector. When pilot sees the instruction and turns it off, signal registers with the tower—equivalent to an acknowledgement.

Screen can be used as a general "warning indicator." Trouble in the aircraft's systems, engines, propellers or components could be flashed on the screen, warning pilot to refer to specific instruments of system or component involved.

Terrain clearance warning could be thrown on the screen. Computer as it now stands gives no altitude indications (except that altitude of any high en route terrain is printed on each chart). But Arma engineers see no great problem in incorporating a means of keeping tabs on height of aircraft over ground and flashing a warning to the pilots if this clearance falls below a pre-determined figure.

• **Fail-safe design.** Arma believes its computer is the safest on the market. It is as fail-safe as any instrument can reasonably be expected to be, Arma says.

ARMA'S computer. "Bug" (lower right on screen) represents plane position on map.

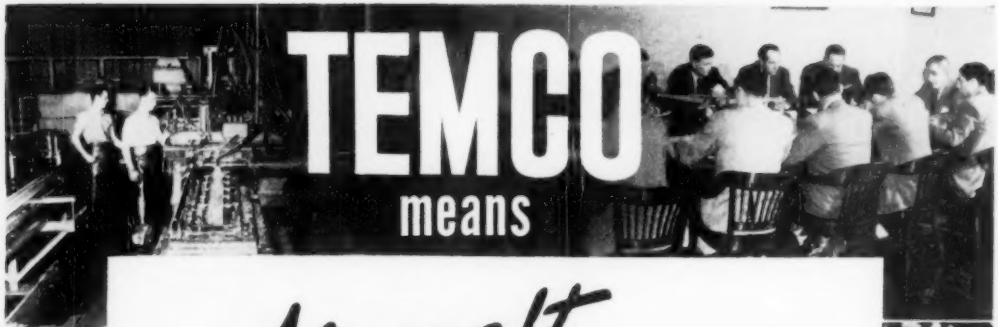
Here is what the unit does to eliminate human error:

• **Automatic tuning.** When the pilot selects a given navigation chart it is thrown on the display unit's screen across which the bug crawls electronically. OBD computers are automatically tuned to the station shown on the screen. The pilot cannot be looking at one chart and be tuned to a station corresponding to another area.

• **Automatic synchronization.** Charts are drawn in four scales. The rate of movement of the bug is automatically synchronized to scale of chart being projected on the screen. The pilot cannot be looking at a 1:2,000,000 scale chart and have the bug's rate of movement correspond to a 1:500,000 scale, for instance.

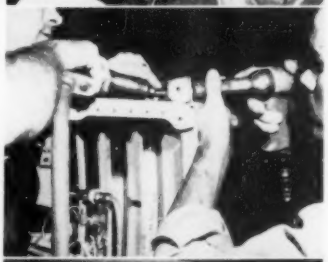
Rounding out fail-safe features of the instrument, Davy says the flag alarm unit of the computer will finger: power failure; failure of any amplifier; failure of any servo to follow signal fed to it; errors in input to computer from omnirange or DME—if either malfunctions or fails, the flag shows it; if input signal is below threshold (too weak) the flag warns the pilot.

• **Projection bulb failure.** A two-bulb carrier at the back of the instrument allows the operator to switch bulbs quickly in case of bulb failure. Handle



TEMCO means

Aircraft Experience



TEMCO has built its aircraft operations from a small group of 500 employes in 1946 to an *experienced* force now over 7000 strong.

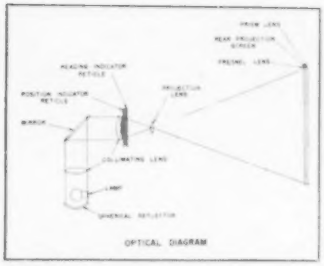
Starting with an original staff of highly trained technicians . . . representing thousands of man-years of experience in every phase of the aircraft industry . . . experienced administration has carefully molded this combination of organizational talent, financial ability and production "know how" into a team that has won TEMCO a place among the country's major aircraft companies.

TEMCO's reputation for design, craftsmanship and skilled aircraft fabrication is nationally recognized. The basis for these qualities is experience.

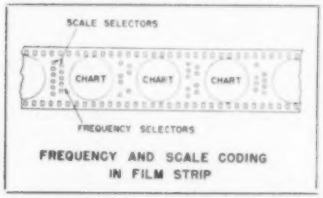
TEMCO

Texas Engineering and Manufacturing Co., Inc.

DALLAS, TEXAS



OPTICAL diagram of Arma computer. Light source is 100-w., horizontally mounted lamp at bottom rear of the display unit.



AUTOMATIC tuning to frequency of stations corresponding to charts is done mechanically through selector holes in film.

is left in the pulled out position as a reminder to replace the burned out bulb at the first opportunity.

▶**How it Works**—The computer consists essentially of a miniature photo-slide projection mechanism projecting onto a daylight, triple-element, see-through screen the information contained on a 35-mm. strip of film and one or two reticles. The chart is projected from the film; bearing and range circles, and "bug" from reticles.

Center of each chart is an Omni Bearing Distance (OBD) station which is the fixed geographical point from which the instrument continuously computes the aircraft's position. Station is identified by call letters, frequency, name, chart identification number and scale.

Radiating from the OBD station may be concentric, equidistant range circles. Four scales are presented:

- **1:2,000,000**—direction finding chart; diameter, 274 mi.; 27.4 mi. equals 1 in.
- **1:1,000,000**—route chart; diameter, 137 mi.; 13.7 mi. equals 1 in.
- **1:500,000**—sectional chart; diameter, 69 mi.; 6.8 mi. equals 1 in.
- **1:250,000**—local chart; diameter, 34 mi.; 3.4 mi. equals 1 in.

▶**Readable Charts**—Charts used with the Arma computer are prepared by the U. S. Coast and Geodetic survey in cooperation with the CAA. Designed for use by highspeed aircraft, the charts' principal attraction is that they are clean and uncluttered, especially when compared to a conventional route chart. This lends to easy and rapid identification and interpretation of terrain. Charts are printed in solid black and halftones and will contrast with the position and heading indicators.

Considerable study went into the type and size of lettering to emphasize important points and attract the pilot's gaze. Chart legends are clear at 40 in., the average distance from instrument panel to pilot's eyes.

▶**Hole Code**—Up to 11 holes are prepunched in the film beside each chart and act very much like the holes punched in IBM cards. Nine of the holes serve to identify the OBD station being projected on the screen.

Mechanical fingers instantaneously interrogate the punched hole code. Through a relay network in the amplifier, the autopositioner tuning mechanism is signaled to tune in the navigation receiver (bearing) and distance measuring equipment (range) matching the chart on the screen.

Two remaining holes in the film are used to synchronize automatically rate of displacement of the bug with the scale of the chart being projected.

▶**Clever Reticles**—The chart remains stationary on the screen. The reticles move across the screen to duplicate exactly the aircraft's path across the terrain represented by the chart.

The single reticle version shows the bug in the form of a plane silhouette and arrow moving in the "X" and "Y" planes and rotating through 360 deg. Actuated by amplified omnirange and DME signals, the single reticle moves the bug across the chart to give the aircraft's position. Heading is also given, but not in exact terms.

In the two-reticle model of the computer the second reticle is introduced between film and "bug reticle," to obtain razor-sharp definition on the screen. The second reticle contains bearing lines radiating from the center and concentric, equidistant range circles.

The two-reticle instrument adds vital range-bearing information to the screen. Big advantage of this version, according to Arma officials, is that it permits pilots to fly direct from departure point to destination. Navigating off-course from OBD stations instead of flying straight up the radials cuts out lots of dog-legging, consequently saves miles and fuel.

▶**Computer Input**—Three servos—range, bearing and heading—instrument the panel pictorial computer. All are of conventional design and operate on 400-cycle signal inputs. Range is obtained from shaft orientation of a potentiometer in the DME equipment. This calculates distance, up to 115 mi., to the OBD station to which it is tuned.

Bearing is obtained as a single-speed.

CAPACITY
FOR BIG JOBS!
ACCURACY
FOR ANY JOB!

South Bend 16-24" Lathe

Here's a lathe with a versatility that makes equipment dollars go further. Its 24" swing provides the capacity for handling a variety of large diameter, medium weight jobs whose size would otherwise require large, heavy lathes. This extra capacity is achieved without any sacrifice of accuracy in the machining of smaller work. Having an unusually wide range of spindle speeds, all sizes of work can be machined at effective cutting speeds. The improved South Bend two lever gear box permits instant selection of power feeds for any turning, facing, or thread cutting operation. A complete line of chucks, tools and attachments simplifies the tooling for this lathe. *Write for catalog* on the 16-24" South Bend lathe.

SOUTH BEND LATHE • South Bend 22, Ind.
Building Better Tools Since 1906

SOUTH BEND LATHES

Bonded Source Inspected

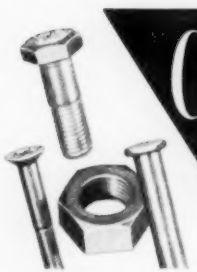
CLARY Aircraft Fasteners

are 3-ways Better...

1 All Clary aircraft fasteners are Source Inspected Bonded Stock manufactured under Statistical Quality Control. That combination is important to you and it costs you no more!

2 Packages plainly labeled with contents... size, part number, specification, when manufactured and by whom. Storage and inventory control is greatly simplified.

3 Source Inspected Bonded Fasteners are "like money in the bank." If declared surplus they can be disposed of at market prices without "red-tape."



Clary MULTIPLIER CORP

AIRCRAFT HARDWARE DIVISION

For information, write, wire or phone:

AIRCRAFT HARDWARE DIVISION

Serving the aircraft industry since 1941

425 E. 54TH ST., LOS ANGELES 11, CALIFORNIA • ADAMS 3-6271 • Cable Address: CLARYMULT

Pictorial Computer Time Table

1947

CAA actively seeks better system than the four-course Aural Ranges for air navigation and the Voice Communication for Traffic control now in use.

1948

Committee representing CAA, leading members of industry and Armed Forces evaluates proposed new systems and agrees on the omnibearing distance system. Committee settles on a 15-year development program to get the OBD System into general use.

1949

Early plans include a Course Line Computer to display course and distance to destination on counters and dials.

CAA-sponsored study at University of Illinois concludes that pictorial computer presentation would assure higher degree of operational safety.

1950

University of Illinois 1949 study results in initiating development work on pictorial computers.

1952

First pictorial computers delivered for evaluation.

400-cycle synchro signal from the omnibearing indicator, a unit of the navigation receiver which calculates bearing to the OBD station to which the receiver is tuned.

Magnetic heading is received as a 400-cycle, single-speed synchro signal from the Gyrosyn compass.

► **Slewer**—Only control of the computer is a slewing handle on the left side of the instrument's cabinet. Pulling the handle out energizes the chart changing mechanism. Moving handle to right or left causes the 35-mm. film to slide past screen in corresponding direction.

Distance the handle is twisted controls the film speed. Charts may be held stationary by centering the handle, slewed right or left slowly enough to allow pilot to read OBD station call letters, or accelerated to a maximum speed of 10 charts per sec. if the next desired station is far along the film.

Releasing the handle, regardless of position, will allow the handle to center and deenergize the chart selector motor. Selected chart is centered automatically to prevent "hunting."

The display unit of the computer (component incorporating the screen)

THE COUNTRY'S **LARGEST** EXTRUSION PRESS...

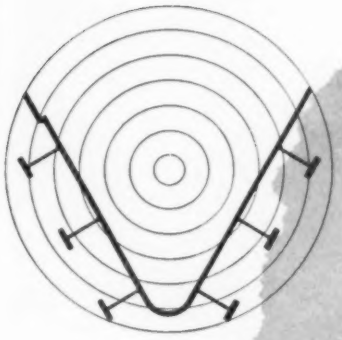
now being installed by Alcoa...

increases maximum extrusion size

from a 15-inch to a 23-inch

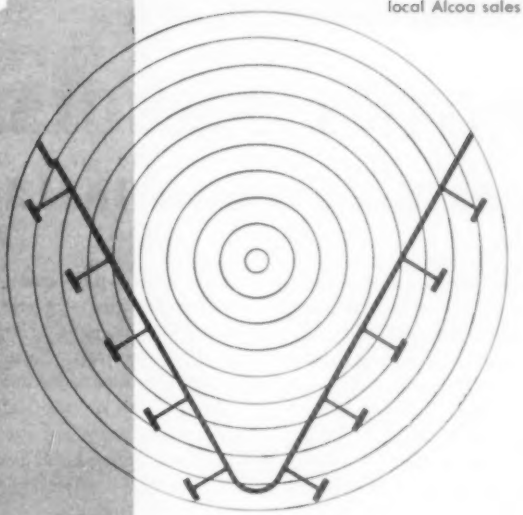
circumscribing circle, or from 600 pounds

to 2300 pounds per piece



The 13,200-ton squeeze of this press means that Alcoa extrusions can be larger, thinner, and more intricate than before. Ribbed extrusions for panels, for example, can be made, as illustrated, 34 inches wide—saving greatly in riveting and assembly.

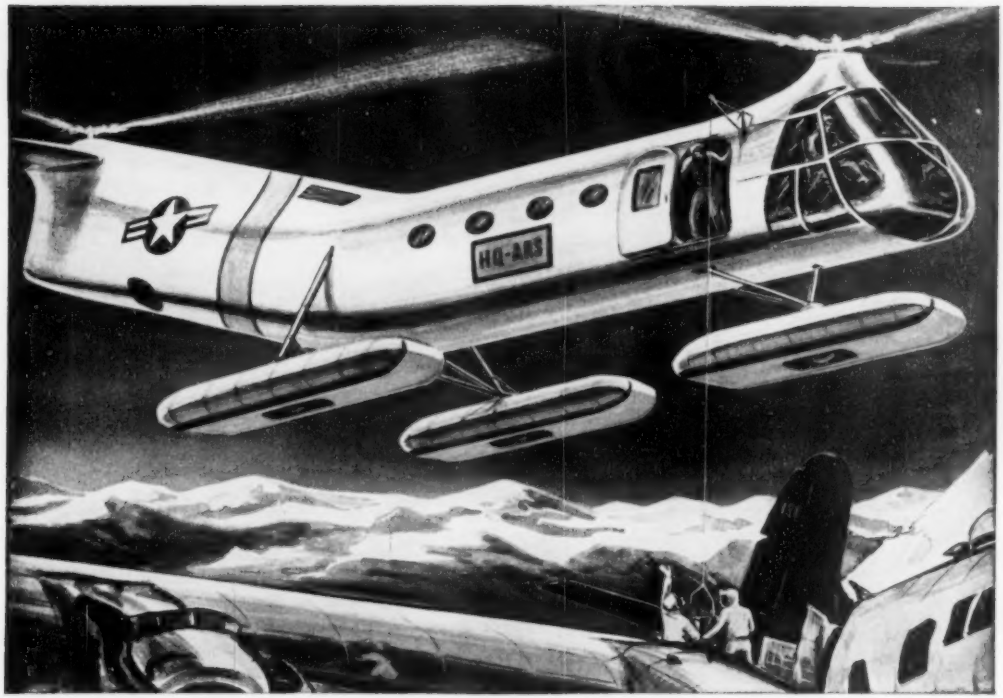
For complete information call your local Alcoa sales engineer.



ALCOA

ALUMINUM COMPANY OF AMERICA

1800-D GULF BUILDING, PITTSBURGH 19, PA.



PIN-POINT PRECISION

starts deep down inside

Hovering, poised, pin-pointed over the target, the Piasecki YH-21 helicopter must convert engine power to rotary-wing lift. Precision transmission gears link and convert this power from engine to rotor blades.

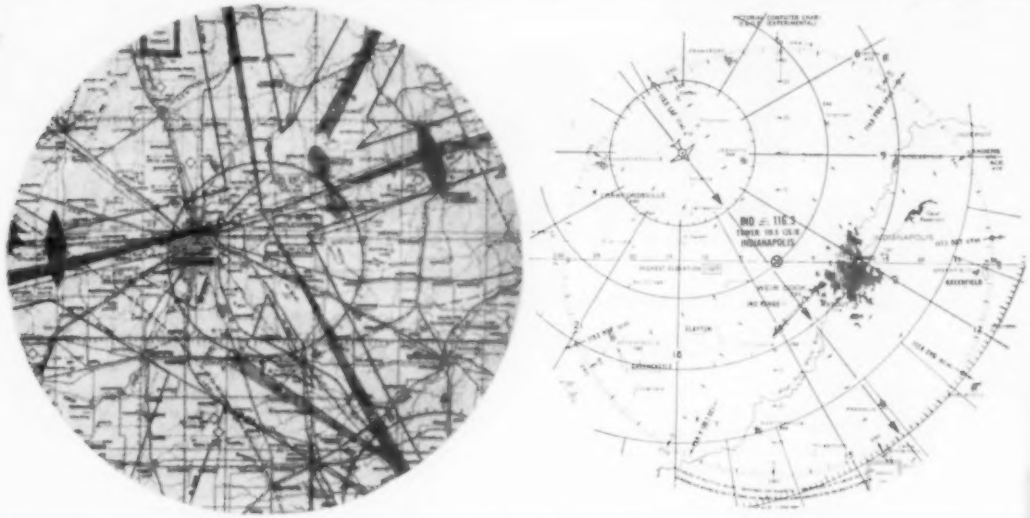
We make these gears . . . and equally precise gear transmissions for gun turrets and radar antennae. It's a job that requires, first of all, a seasoned talent for precision design and manufacture, and this we have been doing since 1914.

Today ninety per cent of our work . . . in research, design, engineering development and production . . . is on aircraft or automotive contracts, for one part or a million, to be made with the utmost of painstaking precision.

These parts, assemblies and products are often unseen. But they are the true secrets of really exact and dependable performance, and hence of the positive power to defend the peace and security of America.

THE STEEL PRODUCTS ENGINEERING CO.

engineers and manufacturers
Springfield, Ohio



CONVENTIONAL route chart of Indianapolis area (left) is cluttered with lines, scales. Cleaner two-reticle (bearing and position) Arma computer chart of same area is shown right. "Bug" shows plane is 27 mi. nw of Weir Cook Airport on a 141 deg. heading.

provides storage facilities for enough film to record 700 charts which are printed on the film in route sequence order. All OBD stations between two terminal cities are listed in order. And the charts are arranged to minimize amount of film movement in flight. Charts are also indexed on a sheet according to position on the film and station call letters.

▶ **Projection System**—Light for the computer comes from a 100-w., horizontally mounted bulb at bottom and rear of the display unit. Light bounces off a spherical reflector, passes through a collimating lens to a mirror angled at 45 deg., to a second collimating lens. Light then passes through the chart film and the reticles.

After being focused by the projection lens, light is thrown on the triple-element screen. Focal length is 25 mm. and magnification is 10X.

The specially developed screen is made up of these elements:

• **Fresnel lens.** This multi-angled prism lens straightens out diverging light rays to assure equal light intensity from center of screen to periphery.

• **Beaded glass screen** (an Eastman Kodak daylight screen development) which gives high brilliance.

• **Prism lens.** This Arma-developed third element sends the light in three paths—about one-third is diverted 30 deg. to the left, for the pilot; another third to the right, for the co-pilot; and the remainder projected straight ahead for the flight engineer. All should see the image with equal intensity.

External surface of prism lens is smooth, so proposed route can be laid out on it by grease pencil. When chart is changed, course may be erased with a cloth and extension drawn over the new chart.

A rheostat permits selection of desired brilliance on the screen from dim for night use to bright for daylight operation.

Projector lamps should have a minimum life of 100 hr. and average 150 hr. A spare is always carried and can be positioned immediately.

▶ **Fly Pictorial**—Flying the computer is simple, Arma says. Here's how to do it:

"Navigation with the Panel Pictorial Computer is simply a matter of selecting the proper chart and keeping the aircraft heading, corrected for crab angle, in line with the route or destination. For example, in a plane leaving LaGuardia for the west, the pilot selects either the route or sectional scale chart of the Caldwell (N. J.) OBD station.

"As the plane flies west, the computer indicates position, heading and distance to next OBD station or destination, continuously tracking the aircraft. The pilot may control the plane to remain in the assigned airway. As the flight position moves off the chart, the pilot operates the slewing control to select the succeeding OBD station at Allentown (Pa.). Ordinarily the next chart required is adjacent to the last chart used, keeping chart changing time to a minimum about 10 sec. Charts are changed every 15-30 min., depending on scale and speed of plane."

▶ **Two-Reticle Bonus**—Here is where the advantage of the two-reticle instrument stands out. The range-bearing reticle (made up of radiating bearing lines and concentric, equidistant range circles) is superimposed on the heading reticle (containing the aircraft silhouette) so that the centers of both coincide and move across the chart as one.

Result is that pilot gets accurate (1 deg.) heading by reading heading against compass rose and exact (½ deg.) bearing indications allow him to navigate in a most precise fashion.

When crab angle (because of wind set and drift) is compensated for, aircraft must pass over successive check points until destination is reached (although only one check point per chart is needed ordinarily).

To correct for crab, pilot needs only "to swing aircraft into the wind in increments until the required point on the chart is held at a constant bearing. Bearing lines are conveniently spaced so that small changes in bearing may be quickly detected."

At destination, pilot selects the local chart of the airport for which he is heading, and lines himself up with the ILS localizer beam for final approach.

▶ **Dimensions**—Display unit is about 15 x 7½ x 17½ in. except for blisters at front end accommodating the 10-in. screen. Other blister at rear houses lamp and blower.

Weight of display unit is 25 lb. Dimensions and weight do not include shock mounts.

Amplifier unit is packaged within

Be Double-Sure

ATLAS AIRCRAFT NUTS

...are Double Chamfered, Double Counter-Sunk

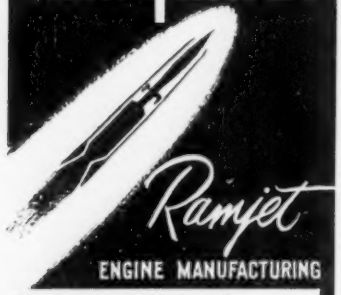
You make double savings, too, with Atlas nuts for the aircraft industry. They require far less time and labor, cut costs, because Atlas aircraft nuts are double chamfered, double counter-sunk, free of burrs. They are precisely made to meet AN specifications—steel, brass, stainless—available for immediate delivery. • ATLAS also offers facilities for the manufacture of special component parts.

For prompt quotations, submit your requirements, giving details, specifications and delivery dates.

AT-117

ATLAS SCREW & SPECIALTY CORP.
450 BROOME STREET • NEW YORK 13, N. Y.

marquardt



ENGINE MANUFACTURING

OPPORTUNITIES FOR...

- aircraft structures design engineers
- fuel controls design and development engineers
- test facility design engineers
- combustion development engineers

MARQUARDT AIRCRAFT COMPANY
7801 HAYVENHURST AVENUE, VAN NUYS, CALIF.

Wanted
ENGINEERS
AND
SCIENTISTS

Unusual opportunities for outstanding and experienced men

These top positions involve preliminary and production design in advanced military aircraft and special weapons, including guided missiles.

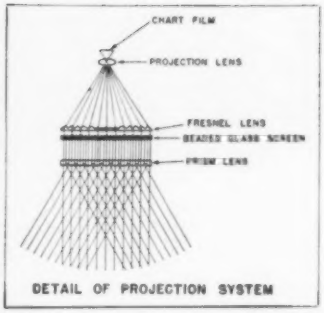
Immediate positions include:

Weight-control engineers
Electronic project engineers
Electronic instrumentation engineers
Radar engineers
Flight test engineers
Stress engineers
Aero- and thermodynamicists
Servo-mechanists
Power plant installation designers
Structural designers
Electro-mechanical designers
Electrical installation designers

Excellent location in Southern California. Generous allowance for travel expenses.

Write today for complete information on these essential, long-time positions. Please include resume of your experience and training. Address inquiry to Director of Engineering.

NORTHROP AIRCRAFT, INC.
1003 E. Broadway
Hawthorne (Los Angeles County) California



DETAIL OF PROJECTION SYSTEM

TRIPLE element prism lens projects light in three directions—to pilot, co-pilot, engineer.

outline of a standard S-2 case. Weight is about 21 lb. including shock mounts. It is to be installed in plane's communication rack.

The panel pictorial computer represents Arma's first venture in commercial aeronautical equipment. Next step, with the same piece of equipment, will be to make the presentation optically rotatable. Then pilot may align the bug to be always flying "up", regardless of actual heading.

▶ **Arma Background**—The Arma Corp., founded in 1918, has done extensive work in the field of Navy gyroscopic gun stabilizers, gyrocompasses and fire control computers. Its engineers developed "brain blocks," a complete line of interchangeable electrical and electronic the Arma induction potentiometer for instrument problems of addition, subtraction, multiplication and division. Another is the Arma electrical resolver, "that replaced a formidable aggregation of gears, bearings and slides previously used to solve trigonometric functions."

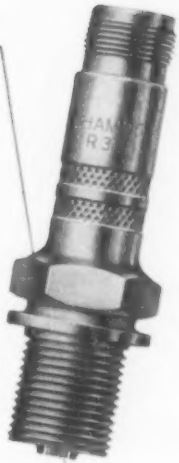
Arma, currently established at Bush Terminal, Brooklyn, N. Y., is a subsidiary of the American Bosch Corp. whose precision skills and manufacturing resources may supplement Arma's as needed. Latest expansion is the erection of a new research, development and manufacturing center occupying some 20 acres at Roosevelt Field, L. I., N. Y. The facility is expected to open by mid-year.

LAV Connie Work

Two Model 049 Constellations belonging to Linea Aeropostal Venezolana (LAV) will soon go into Lockheed Aircraft Service–International's hangars at New York International Airport for 8,000-hr. overhauls. First ship goes into the Lockheed shops in August, second in October.

An LAV Lockheed Lodestar is currently in LASI's hangars for fuel tank stripping and resealing.

Memo: All Airline Personnel!



Aircraft-Type Champion

Your own company specifies Champion Aircraft Spark Plugs because both ground and flight tests show Champions unequalled in quality, dependability and performance.

Since Champion knows only one standard of quality, its automotive spark plugs must meet these same high standards.

Are you using the same careful judgment in the selection of spark plugs for your own car?

You can profit by your own company's findings by insisting on Champions—the choice of engine experts the world over.

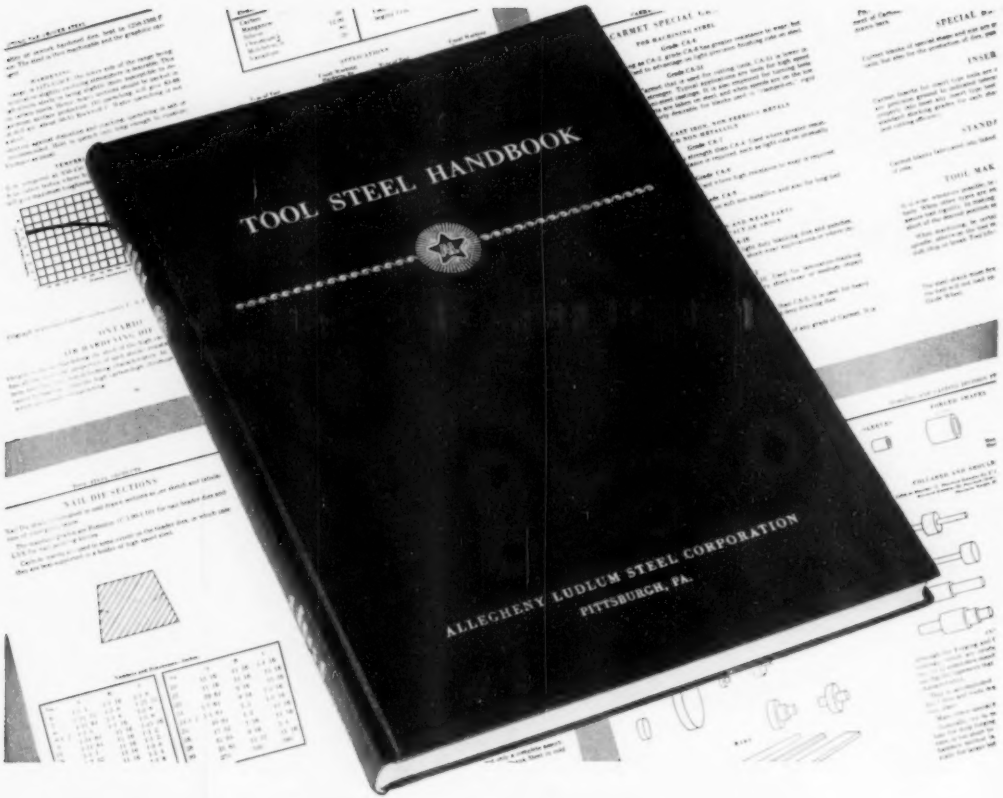
CHAMPION SPARK PLUG COMPANY, TOLEDO 1, OHIO

Automotive-Type Champion

AMERICA'S FAVORITE

CHAMPION

SPARK PLUGS



AVAILABLE NOW—196 pages of Valuable Tool Steel Information

A new Tool Steel Handbook—one of the most comprehensive treatises of its kind ever offered by a tool steel producer—has just been published by Allegheny Ludlum. In addition to a relatively complete picture of Allegheny Ludlum Tool Steels, their properties, applications and the forms in which they are available, this 196-page case-bound book presents an extensive discussion of heat treating and handling techniques as well as a complete set of weight tables and other useful reference material.

Your copy of the Tool Steel Handbook will be sent—*without charge*—upon request. Our only stipulation: please make your request upon your company letterhead. • Write Allegheny Ludlum Steel Corporation, Oliver Bldg., Pittsburgh 22, Pa.

ADDRESS DEPT. AV-28

W&D 3948

Remember this also
America must have more Scrap to make more Steel!
Get in the Scrap Now!

For complete **MODERN** Tooling, call
Allegheny Ludlum

AL
FINE TOOL STEELS
SINCE 1854

UAL Buys 5 More Air Conditioners

Five more mobile air conditioners have been ordered by United Air Lines to supplement the five original units already in service.

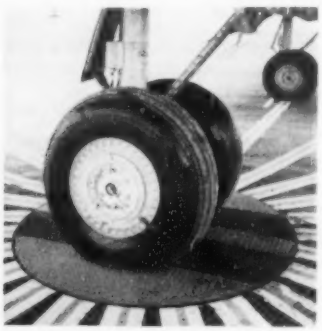
The machines, manufactured by Chrysler Air-Temp Corp., have a cooling capacity of 28 tons, chilling air at a rate of 2,000 cubic ft. min. Heating section, using Stewart-Warner units, delivers a 250,000 Btu./hr. blast.

Housed in special Fruehauf Trailer Co.-designed bodies, the air conditioners are mounted on one-and-a-half ton International Harvester (LC-162) cab-forward truck chassis.

UAL has also purchased five additional heaters to install in the first five air conditioning units which were equipped for refrigeration only.

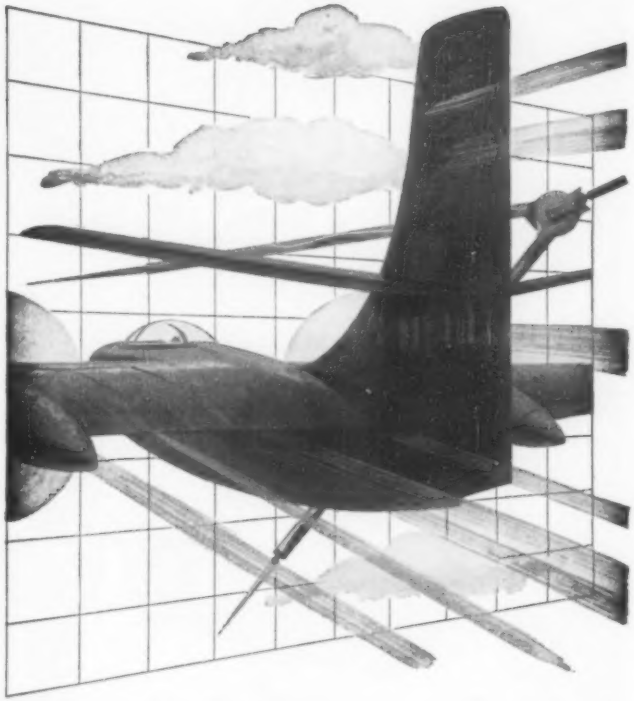
Argentine Overhaul

Five Argentine Airlines' DC-4s are being overhauled by Lockheed Aircraft Service–International. Work includes standardizing instrumentation with the airline's DC-6s, stripping and resealing fuel tanks, galley overhaul and redesign and modification radio gear.



TURNTABLE TIME SAVER

This compass rose turntable, recently installed at the Oakland, Calif., Municipal Airport has "reduced the time factor in swinging C-54 type aircraft directional magnetic and Fluxgate compasses from 4 hr. to a maximum average of 1 hr. and a low time 15 min.," according to the maker, Wakefield Engineering Co. The Coeur d'Alene, Ida., firm adds that since swinging compasses on C-54s requires a four-man crew, approximately 12 manhours are saved. Turntable is set in the center of a 152-ft. dia., 8-in. thick concrete pad. The turntable itself is 6 ft. 6½ in. in dia. and can withstand loads up to 100,000 lb. The manufacturer says that other turntable installations have been made at USAF and Coast Guard bases and for industry.



Bristol Automatic Control

GUARDS AIRCRAFT SAFETY AND OPERATING EFFICIENCY

Leading aircraft manufacturers use Bristol Automatic Precision Control Equipment on fighter planes, bombers and transports.

Products of over 60 years of Bristol pioneering in the field of precision instruments, they have proved their merit under exhaustive flight tests in extreme climates and at high altitudes.

What are your instrument control requirements? Bristol's Aircraft Division is especially geared to design and produce aircraft control devices such as engine temperature controllers, timers, and other electronic and electro-mechanical control devices.

The Bristol Company is a leader in the development of instruments and devices for indicating, recording and automatically controlling temperature, pressure, flow and other fundamental quantities.

With aeronautical development proceeding at a rapid pace, Bristol engineering and production facilities are available to solve *your* aircraft control problems.

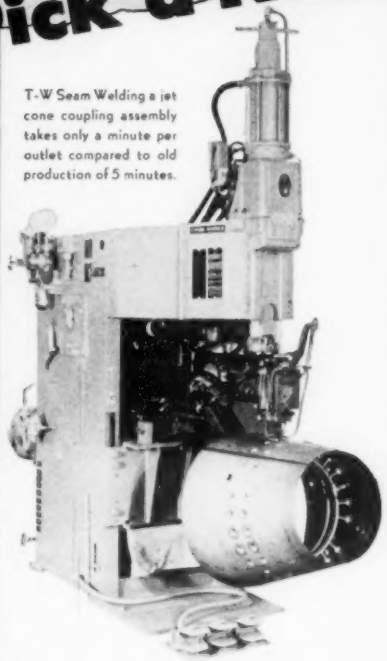
There are Bristol branch offices in 26 principal cities and Bristol factories in Chicago, San Francisco, Toronto and London. Address inquiries to The Bristol Company, Aircraft Equipment Div., at 130 Bristol Rd., Waterbury 20, Conn.

BRISTOL

FINE PRECISION INSTRUMENTS FOR OVER 60 YEARS

Cessna Bendix Pratt Packa
Budd **Pick a Name** Gibson
Sikorsky General Ele
A. V. Roe Lewyt
McDonnell Twin Coac
American Northrop
MacDonald Oldsmobile
Douglas Beech
North Amer Western Ele
Canadair Allison
Ryan Aero Westingho
Goodyear Hughes
Glen Martin Consolidat
Boeing Harrison
Solar Aircr United Airc
ChanceVou Heintz

T-W Seam Welding a jet cone coupling assembly takes only a minute per outlet compared to old production of 5 minutes.



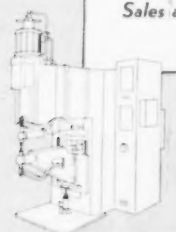
Any one of them uses T-W Resistance Welders to meet Military Specs

● Users of T-W resistance welders have been meeting military specs for some 12 years. When you meet up with the current specifications Mil-W-6860 and 6858 (formerly AN-W-30 and 32), take advantage of this experience. Whether your job is ordnance, aircraft parts, radar, or what have you—you can meet military specifications with T-W welders.

Call on Taylor-Winfield for counsel and assistance on your production. All sizes and styles of resistance welders.

TAYLOR-WINFIELD CORPORATION · WARREN, OHIO

Sales and Service in All Principal Cities



RESISTANCE WELDERS SINCE 1898

TAYLOR-WINFIELD
RESISTANCE WELDERS

NEW AVIATION PRODUCTS

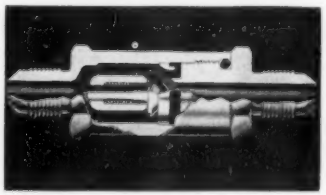
Coaxial Switch

A lightweight, high-performance coaxial switch has been developed by Thompson Industries Products, Inc.

Built to meet rigid military requirements, according to Thompson, it is actuated by a 24-28-v. d.c. rotary solenoid, is capable of handling continuously 100 watts c.w. at 3,000 mc. Actuation time is less than 0.5 sec. Switch is said to have a minimum life of 10,000 cycles.

At frequencies up to 11,000 mc., it has a maximum voltage standing wave ratio of 1.5 db. and less than .2 db insertion loss.

Thompson Products, Inc., Electronic division, 2196 Clarwood Rd., Cleveland 3, Ohio.



4,500-psi. Valve

A check valve designed for aircraft pneumatic systems, reportedly capable of handling pressures up to 4,500 psi without leaking, has been placed on the aviation equipment counter by the Cornelius Co.

Down at the other end of the scale, the valve is said to provide a positive seal with a pressure differential of only 0.5 psi. It has a direct air passage, enlarged around the poppet, which keeps pressure drop at a minimum and permits high volume flow. The streamlined poppet also contributes to speeding up the flow. The poppet spring is not exposed to or affected by the air.

The large seating area in the valve

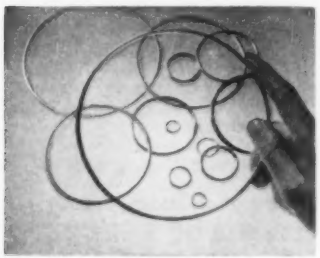
assures that it is not readily affected by foreign particles or ice formation on the seat, according to the company.

Under low pressure differential conditions, the rubber seat provides the sealing action. When pressures are high, the poppet presses tighter against the seat giving both metal-to-metal and rubber seal.

The rubber seat is securely retained in the valve to prevent it from being "washed out" in high surge flow conditions, explains the firm. It meets surge flow requirements of Spec. MIL-V-5524A for hydraulic check valves using fluid conforming to Spec. MIL-O-5606. The rubber seat compound is impervious to MIL-O-6085 (AN-O-11) and MIL-O-6081 (AN-O-9) oils which are used for lubricating compressors in pneumatic systems.

The valve is available in aluminum or stainless steel, minimum weight for the former being 0.07 lb. and for the latter, 0.16 lb.

Cornelius Co., Minneapolis 1, Minn.



Tough O-Rings

A new type of seal ring, termed a "new answer to static sealing requirements" in many aviation applications, has been announced by United Aircraft Products, Inc.

The seals are special O-rings—actually hollow tubes filled with inert gas at 600 psi.—which provide positive metal-to-metal static sealing wherever problems of heat, pressure, corrosive liquids or gases are involved. They have been used successfully in landing gear components, various hydraulic applications, in air compressors, vacuum systems and have helped solve various special problems, arising in aircraft system design, United says.

Made of stainless steel, or nickel- or cadmium-plated mild steel, they handle pressures up to 20,000 psi., and resist high temperatures.

UAP/Wills Metallic O-Rings can be installed in present ring grooves, in free machined recesses, or installed without grooves and recesses by means of a special compression limiting device that can be incorporated in the rings. Wills Ring Co., a British firm, recently licensed UAP to produce the new-type rings in this country. They aren't new

Panagra depends on EDISON FIRE DETECTION

"...(our) crews know for sure that the system is working properly."

PAN AMERICAN-GRACE AIRWAYS, INC
EXECUTIVE OFFICES
CHRYSLER BUILDING • NEW YORK 17, N.Y.

Instrument Division
Thomas A. Edison, Incorporated
51 Lakeside Avenue
West Orange, New Jersey

Gentlemen:

The engines of Panagra's DC-6s are guarded by Edison fire detectors.

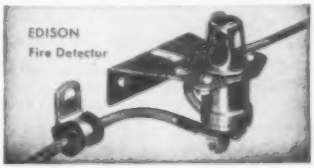
Our deluxe DC-6 El InterAmericano provides daily service down the west coast of South America - a route which demands top dependability from the airplane and equipment. The one outstanding feature of the Edison fire detector system is the positive operational check available to the crew from the flight compartment. Panagra crews know for sure that the system is working properly at all times - on the ground or in flight.

The Edison system has given completely dependable performance, and has contributed much toward our goal of reducing mechanical delays to a bare minimum.

Very truly yours,
Thomas J. Kirkland
Vice President - Operations

HERE'S HOW THE TEST FEATURE WORKS—

When the test switch in the pilot's compartment is energized, a thermocouple current passes *through* each detector in the circuit. This guarantees the integrity of the circuit and the detectors themselves. And since the test current is generated by a sealed-in-glass thermocouple, the system check simulates actual fire conditions with complete safety.



Practically every major air line in the U.S.A. depends on EDISON fire detection. Send for free Bulletin AW5-5003.

Thomas A Edison
INCORPORATED
Instrument Division
51 Lakeside Avenue, West Orange, N. J.
MANUFACTURERS OF *Electrical Resistance Bulbs, Temperature Indicating and Alarm Systems, Sealed Thermostats.*
YOU CAN ALWAYS RELY ON EDISON

Which type of oil is best for your airplane engine?

For smooth, reliable performance—and to s-t-r-e-t-c-h the time between overhauls—just remember these two recommendations from Gulf:

For horizontally opposed, and Ranger in-line engines, use Gulfpride Aviation Oil, Series-D

Here's the world's finest detergent-dispersant aviation oil. By keeping contaminants "in suspension" and thus preventing them from forming harmful deposits, Gulfpride Aviation Oil, Series-D, minimizes ring and valve-sticking, oil consumption, oil screen-clogging, and plug-fouling.

Gulf's exclusive Alchlor process—an *extra* refining step—makes this oil *extra*-pure, *extra*-efficient. Users of Gulfpride Aviation Oil, Series-D, have actually increased periods between engine overhauls as much as 100%!

For radial engines, or where a detergent oil is not desired, use Gulf Aircraft Engine Oil, Series-R

Here's the best-quality buy in a non-detergent, straight mineral lubricating oil. Gulf Aircraft Engine Oil, Series-R, is approved by Pratt & Whitney and meets the requirements of other aircraft engine manufacturers for all types of service in radial engines. It may also be used in horizontally opposed engines when operating conditions do not require a detergent oil.

Gulf Aircraft Engine Oil, Series-R, retards sludge and carbon formation, and retains its body at high operating temperatures.

GULF

AVIATION PRODUCTS

Got your new Gulf "Airgide Directory of Airport Dealers"?

It's a "must" for active pilots. Just ask your Gulf Airport Dealer for a copy. And here's a tip: the best way to use the Airgide, and Gulf Airport Dealers' service, is with a *Gulf credit card*. Ask the Gulf man about it.

It's great to go flying with GULF

in England, though, having been in use there for several years now.

United Aircraft Products, Inc., Dayton, Ohio.

Portable Tie-Down

Tetheralls, new portable anchors that can be driven into the ground to moor aircraft and livestock, provide adequate tie-down facilities for flying farmers, pipeline patrols and other lightplane users no matter where they land.

The anchors have metal shafts with augers on the end which screw into the ground. Mechanical advantage for forcing the anchors into the ground is provided by a large lever, a detachable part supplied with unit. One of these tie-downs can secure a DC-3 if wind conditions aren't too severe, the maker says. Units measure a little more than a foot in length, weigh about 3 lb. Klarwin Farms, Nottingham, Pa.

Cleans Planes Fast

Magnus 72, a new steam cleaning compound for safe, fast and thorough cleaning of aircraft assemblies and other equipment, has been developed by Magnus Chemical Co.

A liquid concentrate, the cleaner "has repeatedly demonstrated its ability to do a better job than conventional steam cleaners," Magnus asserts. It can be used–without any change in set-up–wherever vapor or steam equipment is in service.

An advantage claimed for the product is that it contains no alkaline salts and therefore is electrically non-conductive and non-corrosive to soft metals such as aluminum. Older alkaline salts cleaners used on electrical equipment left residues which "were a constant source of short circuiting troubles," Magnus explains. And they attacked aluminum.

The new cleaner is safe on hands. It can be used indoors.

Magnus Chemical Co., Inc., South Ave., Garwood, N. J.

Sheet Metal Nut

A sheet-metal plate nut designed in conformance with military aircraft specifications has been announced by Tinnerman Products, Inc.

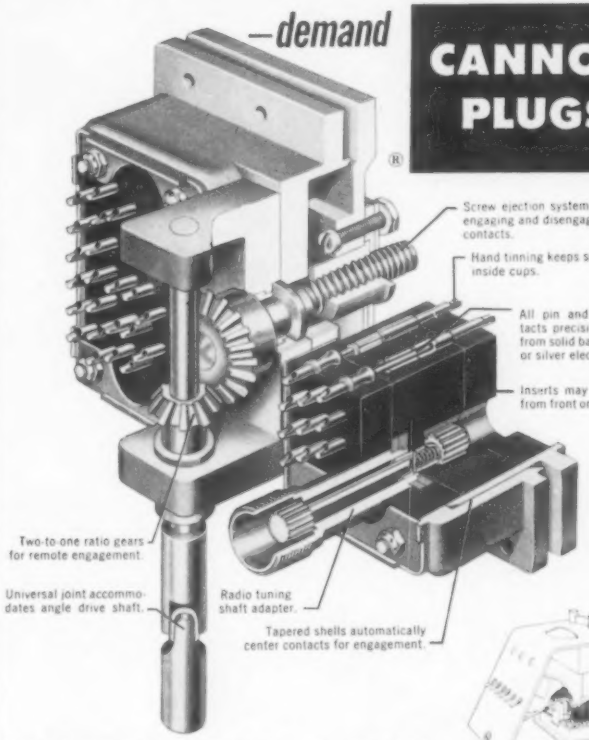
A self-locking type, the nut is made from strip stock, avoiding production problems arising from shortages in bar stock materials. It is stamped into a box shape with lips for anchoring. A tough fibre washer, housed in a sheet metal retainer, provides the self-locking feature. Nut plates presently are available in 8/32 and 10/32 sizes.

Tinnerman Products, Inc., Cleveland, Ohio.

Here's why those in the know

—demand

CANNON PLUGS

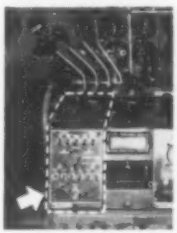

Screw ejection system for engaging and disengaging contacts.
Hand tinning keeps solder inside cups.
All pin and socket contacts precision machined from solid bar stock, gold or silver electroplated.
Inserts may be removed from front or rear of shell.
Two-to-one ratio gears for remote engagement.
Universal joint accommodates angle drive shaft.
Radio tuning shaft adapter.
Tapered shells automatically center contacts for engagement.

This highly specialized DPD2 Cannon Plug, a member of the DP Series, has its principal use in aircraft instrument panels and remote radio control equipment. But, like many other Cannon Plugs, it has found its way into other fields where the highest quality is needed and where the value of long, trouble-free performance is recognized.

Originally this 2-gang connector was designed to assist in the standardization of radio and instrument assemblies so that such equipment might be interchanged between similar aircraft. It allows for compact design in close quarters with access from the front only. This type of application and variations of the fittings are shown at right. Any Cannon DPD insert may be placed within the shell, with or without tuning shaft, coax, twinax, large or small contacts, provided the separation forces of both halves are similar.

This plug typifies the close attention to important detail that distinguishes every Cannon Plug—the world's most extensive line. If you are looking for real value, regardless of the field you work in, your best bet is Cannon.

Connector is separated by turning slotted shaft here. Complete unit may then be removed from pedestal, shown below.



(Left) Same Cannon Plug without tuning shaft. Straight drive instead of 90° gear. (Right) Similar DPD2 with Dzus wing nut extraction method and junction shells. There are several other variations. Write for details.

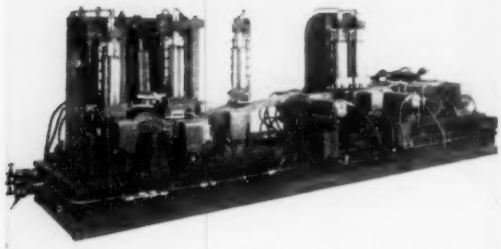
CANNON ELECTRIC

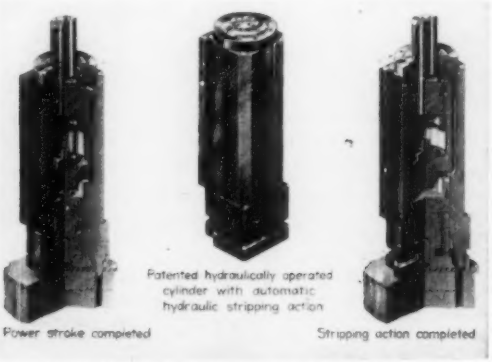
Since 1915

CANNON ELECTRIC COMPANY
LOS ANGELES 31, CALIFORNIA

Factories in Los Angeles, Toronto, New Haven. Representatives in principal cities. Address inquiries to Cannon Electric Company, Dept. D-110, P.O. Box 75, Lincoln Heights Station, Los Angeles 31, California.

HYDRAULIC PIERCING MACHINE is compact. Operator (right) puts machine on automatic or manual by means of selector switch.




Patented hydraulically operated cylinder with automatic hydraulic stripping action
Power stroke completed
Stripping action completed

HEART OF DANLY'S LINE is hydraulic cylinder assembly with built-in blankholding and stripping. Action is illustrated at right.

Automatic Tools Work Tough Jet Metals

New line of machines is designed for quick, accurate hole- or slot-piercing, metal-trimming, riveting.

The transition from piston engines to jets hasn't been an easy job production-wise. Components are different, there are new and tougher metals, and fabricating the parts have required new shop techniques and machines.

Tailored for the new manufacturing schemes is a series of automatic tools built by the Danly Machine Specialties, Inc., Chicago.

The new tools include a machine for piercing slots in jet engine shroud rings and other circular parts, and equipment for producing simultaneously a large number of accurately pierced holes in material tough to work, for trimming metal and for rapid riveting assignments. Heart of the new machines, originally patented by Mueller Engineering Co., Dearborn, is a specially designed hydraulic cylinder.

▶ **Slotter**—In the slot-piercing application, consistent production of uniform parts is insured by an indexing mechanism for accurate spacing. Master indexing rings are quickly interchangeable to vary spacing between holes. A constant torque is applied to the index table driven by a large ring gear in contact with a pinion actuated by a speed reducer teamed to a hydraulic fluid motor. Piercing unit is a floating type actuated by a surge-free hydraulic cylinder serving as a cross-head slide.

A hydraulically operated C-frame slide eliminates distortion of the part during piercing. The part is clear of the die block during the index cycle, eliminating the danger of marking the part and wearing the die block.

All hydraulic directional controls are easily accessible. Electronic controls and control releases are contained in an enclosed cabinet. A pushbutton station is conveniently located for the operator. A selector switch gives automatic or manual operation, the manual operating circuit being for setup purposes only.

▶ **What Machine Does**—With the part locked in place on the locating ring, a pushbutton contact switch starts the automatic cycle. The C-frame moves into the piercing position until the die makes contact with the surface of the part. Here the hydraulic system comes

There's a BETTER JOB for YOU!

in a Healthful Climate...in Arizona or California

Alis Et Animo

Wanted MEN of SKILL and INTEGRITY

As THE world's leading aircraft and engine modification, overhaul and engineering organization, Grand Central Aircraft Co. needs high caliber men . . . Grand Central is a "good place to work" in harmony and among friends. No employee has ever lost one hour's work, by reason of a strike, lockout or work stoppage . . . since the company was formed years ago. Full employee benefits, high wage scales and excellent opportunities for advancement are enjoyed in the security of Grand Central's non-union open shop . . . Join our great Grand Central Team, where both employee and company go by the Golden Rule—"Do unto others as you would have them do unto you"... A better job for you and better living for you and your family in an ideal, healthful climate with unlimited recreational facilities. We welcome applications from dependable men of skill and integrity. For information write to Personnel Manager, care of Executive Office, Grand Central Air Terminal, Glendale 1, California.

WE HAVE OPENINGS FOR:

Engineers • • • Draftsmen
Airplane & Engine Mechanics
Aircraft Electricians
Sheet Metal Mechanics
Sheet Metal Layout Men
Aircraft Radio Installers
Aircraft Radio Mechanics
Inspectors • • • Clerical
and others

GRAND CENTRAL AIRCRAFT CO.

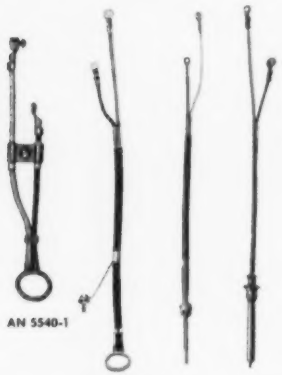
GLENDALE, CALIFORNIA • • • TUCSON, ARIZONA

Grand Central Airport — Municipal Airport

LEWIS
Thermocouples

Iron-Constantan
Copper-Constantan
Chromel-Alumel

FOR MEASURING
TEMPERATURES IN AIRCRAFT



AN5540-1 18 MM. iron-constantan Sparkplug-gasket type thermocouple for measuring cylinder-head temperatures. Also available in copper-constantan and in 14 MM size for either material.

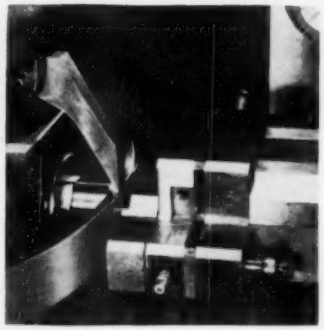
AN5540-2 Iron Constantan Sparkplug-gasket type with copper ring for 18 MM plugs. Wire guard and supporting bracket are stainless steel and conductors are protected with flexible heat-resistant sleeving. AN5539 terminals are silver-soldered to leads.

AN5541-1 Iron Constantan Bayonet Type thermocouple with junction located in silver tip. Spring used with this thermocouple will retain its strength despite high temperatures.

AN5545-1 Chromel-Alumel Tailpipe Thermocouple. Insulated with a temperature-resistant ceramic and overbraided with stainless steel wire, this thermocouple is built to withstand severe jet engine service.

We invite inquiries on your temperature measuring problems.

THE LEWIS ENGINEERING CO.
Manufacturers of Complete Temperature Measuring Systems for Aircraft
NAUGATUCK, CONNECTICUT



PIERCING CLOSEUP shows the stripper, die and workpiece (lower left).

into play and high pressure fluid for the piercing operation is supplied.

When the control relay times out, flow of hydraulic fluid is reversed, causing the punch to withdraw, the power cylinder and C-frame slide returning to the open position. A limit switch directs fluid to the locking latch cylinder of the index mechanism and the table starts rotating as released.

As soon as the locking latch reaches open position, pressure in the actuating cylinder is reversed, causing the index latch to engage the ring in the next index notch, a limit switch again starting the piercing cycle. The sequence of operation continues until the index table rotates through 360 deg., when the machine will come to a stop for the unloading and subsequent loading operation.

► **Hydraulic Heart**—Business end of the machines, and basic on all types produced by the firm, is the versatile hydraulic cylinder assembly.

As described by Danly, it makes possible, "built-in blankholding and stripping action, which is entirely automatic and requires no springs." This action is effected hydraulically after the power stroke on the metal being worked.

Principal features of the hydraulic system include "continuous pressure intensification permitting wide flexibility in adding cylinders in the circuit of the power unit," engineers explain. A patented transfer valve enables the system to handle high pressures while eliminating hydraulic shock.

Because of these features, the small, compact, working cylinders can concentrate forces over 200 tons, permit piercing holes under difficult conditions. Holes can be punched in steel whose thickness is greater than their diameter. An example of material that has been successfully worked in this manner is ⅝-in. thick, high carbon SAE 1095 steel, heat-treated to 41 Rockwell C.

Danly Machine Specialties, Inc., 2100 S. Laramie Ave., Chicago.

PRODUCTION BRIEFING

► **The Austin Co.** has established new headquarters for its rapidly expanding Special Devices Center in the Port of New York Authority Building, 76 Ninth Ave., New York.

► **Beckman & Whitley, Inc.**, San Carlos, Calif., instrument engineers, have established a Guided Missile Products division to direct design consultation and manufacturing of explosives-actuated devices.

► **Bell Aircraft Corp.**, is taking over the former Niagara Wallpaper Co. plant in Niagara Falls, N. Y., as part of its expanded guided missiles program. The facility encompasses more than 181,000 sq. ft. of space.

► **Boeing B-52A jet pods** and rear fuselage sections will be made by Rohr Aircraft Corp., Chula Vista, Calif., release cleared by Defense Dept. discloses. Number of units is not announced.

► **Consolidated Engineering Corp.**, Pasadena, Calif., has purchased the 35-acre Monrovia Airport to secure property for future expansion. CEC now operates two plants in Pasadena.

► **Detroit Engine division** of Kaiser-Frazer Corp. has had its Wright R-1300 engine contract boosted 25% by USAF.

► **Daystrom Electric Corp.**, Poughkeepsie, N. Y., has delivered its first bombsight under U. S. Navy Ordnance contract. Daystrom has orders for more than 30 defense projects.

► **Grand Central Aircraft Co.**, Tucson, Ariz., has been granted a $5.1-million facilities contract by USAF to provide permanent construction at Tucson Municipal Airport in preparation for its B-47 modification program.

► **Sprague Electric Co.**, North Adams, Mass., has established a Pacific Coast application engineering office and radio noise suppression laboratory at 11325 Washington Blvd., Culver City, Calif., to serve electronics and aircraft industries in that area. Manager of the new office is Thomas S. Bills.

► **Temco Aircraft Corp.** (formerly Texas Engineering & Manufacturing Co.) Dallas, has initiated a profit-sharing retirement plan covering all salaried employes of Temco and its Luscombe subsidiary. Temco has also started a pension plan and trust for all salaried clerical and plant protection employes of both companies.

THE *Workhorse* OF SMALL GRINDERS

Aro Short Grinder Model 7149, 17,000 R.P.M., in airframe assembly work at Rohr Aircraft.

ROHR AIRCRAFT
Steps-up Production with ARO

You can't beat 'em for "workhorse jobs" in grinding, polishing, filing . . . ARO does it *faster* . . . at *lower cost!*

That's why Rohr Aircraft at San Diego—and hundreds of other progressive plants today—prefer ARO. Complete line grinders for jet engines . . . also heavy duty vertical and horizontal grinders of all types. Write for new catalog 60. The Aro Equipment Corp., Bryan, Ohio. Aro Equipment of Canada, Ltd., Toronto, Ont.

ARO AIR TOOLS

Also . . . LUBRICATING EQUIPMENT . . . HYDRAULIC EQUIPMENT . . . AIRCRAFT PRODUCTS . . . GREASE FITTINGS

THE ARO EQUIPMENT CORPORATION, BRYAN, OHIO

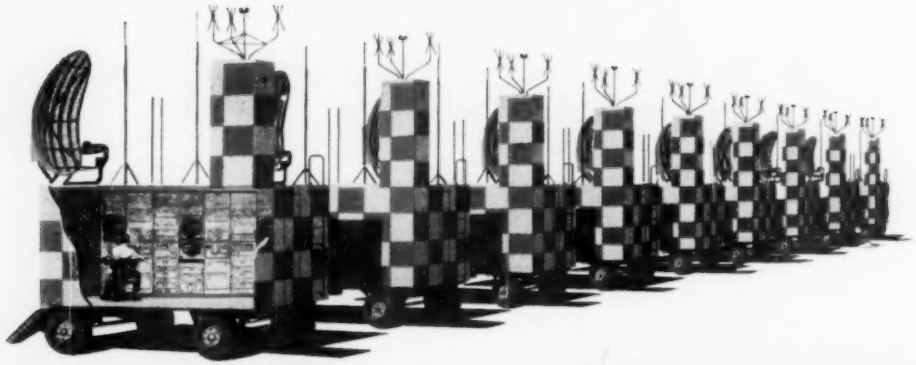
Without obligation please send the new ARO tool catalog No. 60.

Name_____

Company_____

Street_____

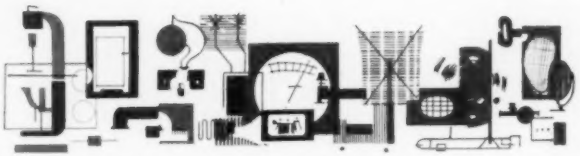
City_____ State_____



To Deliver 1 GCA Radar Every 48 Hours Takes

Experience . . . *Gilfillan has it*

40 years of pioneering radio, television and electronic research and development • Development and production of GCA landing system and other radar equipment for USAF in World War II.

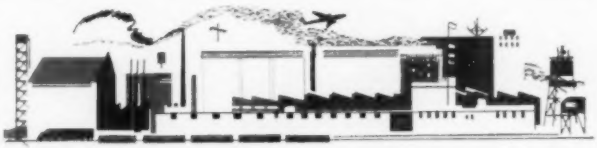


Men . . . . . *Gilfillan has them*

2500 carefully selected and highly skilled specialists • 100 special factory-trained tech reps. Men who provide around-the-world service and maintenance of Gilfillan GCA and other complex radar systems.

Plants and Facilities
. . . *Gilfillan has them*

7 separate modern plants, containing the very finest precision equipment, spread throughout Southern California • Over 2000 suppliers.



Research . . . . . *Gilfillan has it*

10 years devoted *exclusively* to years-ahead research for the United States Armed Forces. And—since its formation—for NATO.

Gilfillan Has What It Takes!

Gilfillan
Los Angeles

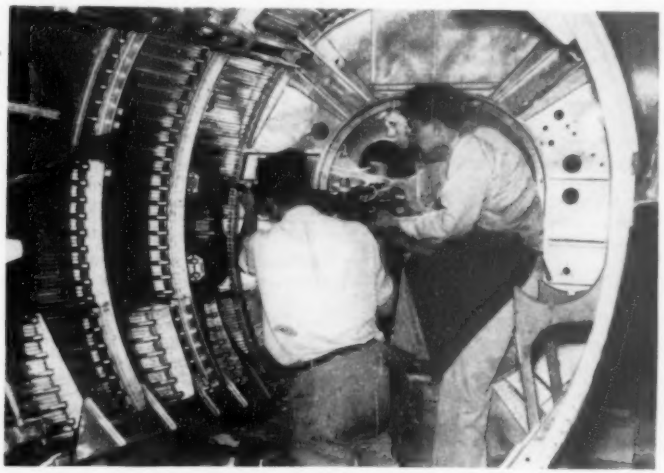
GILFILLAN GCA IS THE FIRST STANDARD EQUIPMENT ADOPTED BY 24 ALLIES OF THE FREE WORLD

Certificates Of Necessity

Accelerated tax amortization for manufacturers expanding their defense facilities is granted by the government in the form of certificates of necessity.

In the following list of recent certificates, company name is given, followed by product or service, cost of construction deemed necessary for defense expansion but of no likely civilian use after the emergency, and the percentage of the expansion cost allowed for fast tax write-off. Fast write-off permits property to be depreciated in five years, rather than 20-25 years.

- **General Motors Corp.**, Saginaw, Mich., aircraft parts, $675,000, 65%.
- **General Motors Corp.**, Elyria, Ohio, aircraft parts, $1,791,000, 65%.
- **Aeroquip Corp.**, Jackson, Mich., hydraulic fuses, $44,760, 65%.
- **Standard Steel Treating Co.**, Detroit, Mich., aircraft parts, $86,445, 50%.
- **Steel Improvement and Forge Co.**, Cleveland, Ohio, aircraft parts, $19,397, 65%.
- **Shakespeare Co.**, Kalamazoo, Mich., aircraft parts, $50,000, 65%.
- **Goodyear Aircraft Corp.**, Akron, Ohio, ZPN airships, $338,912, 65%.
- **Bendix Aviation Corp.**, Mishawaka, Ind., aircraft parts, $150,138, 65%.
- **American Radiator and Standard Sanitary Corp.**, Litchfield, Ill., magnesium castings for aircraft, $549,750, 65%.
- **Ladish Co.**, Cudahy, Wis., aircraft parts, $1,760,630, 65%.
- **The Chicago Screw Co.**, Bellwood, Ill., aircraft parts, $1,004,984, 65%.
- **G-M Laboratories, Inc.**, Chicago, Ill., aircraft parts, $70,532, 75%.
- **Speed Queen Corp.**, Ripon, Wis., aircraft engine parts, $170,000, 65%.
- **Dundick Tool Works**, Ridgfield, Ill., aircraft parts, $32,000, 80%.
- **B. and F. Machine Products Co.**, Chicago, Ill., aircraft parts, $19,251, 80%.
- **DuPage Precision Products**, Naperville, Ill., aircraft parts, $86,974, 80%.
- **Chicago Screw Co.**, Bellwood, Ill., aircraft, $1,063,082, 65%.
- **General Motors Corp.**, Anderson, Ind., aircraft parts, $2,148,502, 65%.
- **Mayfair Industries, Inc.**, Chicago, Ill., aircraft parts, $104,346, 80%.
- **The Pierce Governor Co., Inc.**, Anderson, Ind., aircraft parts, $262,206, 70%.
- **A. O. Smith Corp.**, Milwaukee, Wis., aircraft parts, $111,600, 65%.
- **Arnolt Corp.**, Warsaw, Ind., aircraft parts, $24,121, 80%.
- **Chicago Metal Hose Corp.**, Savanna, Ill., aircraft parts, $11,610, 70%.
- **Tube Processing, Inc.**, Indianapolis, Ind., aircraft parts, $124,260, 70%.
- **U. S. Rubber Co.**, Fort Wayne, Ind., aircraft parts, $409,418, 50%.
- **General Electric Co.**, Fort Wayne, Ind., aircraft parts, $285,200, 65%.
- **Solar Aircraft Co.**, Des Moines, Iowa, aircraft parts, $56,186, 65%.
- **Mid-Western Industries, Inc.**, Wichita, Kan., aircraft parts, $19,574, 65%.
- **Pioneer Central Division**, Bendix Aviation Corp., aircraft accessories, $2,022,999, 65%.
- **Ford Motor Co., Claycomo**, Clay City, Mo., military aircraft components, $20,762,545, 65%.
- **Jarvis Mfg. Inc.**, Wichita, Kan., aircraft parts, $11,704, 80%.
- **Rheem Mfg. Co.**, Houston, Tex., ordnance, $418,169, 65%.
- **Rheem Mfg. Co.**, New Orleans, La., ordnance, $70,970, 65%.
- **Southwest Airmotive Co.**, Dallas, Tex., aircraft, $15,026, 65%.
- **Intercontinental Mfg. Co., Inc.**, Garland, Tex., aircraft components, $34,750, 70%.
- **Douglas Aircraft Co., Inc.**, Bell, Calif., airplanes and parts, $307,491, 65%.
- **Douglas Aircraft Co., Inc.**, Santa Monica, Calif., aircraft, $579,336, 65%.
- **Aero-Coupling Corp.**, Burbank, Calif., aircraft parts, $15,294, 65%.
- **Hammond Mfg. Corp.**, Pasadena, Calif., aircraft servicing equipment, $63,799, 65%; $200,636, 45%.
- **Northrop Aircraft, Inc.**, Hawthorne, Calif., aircraft and parts, $554,208, 65%.

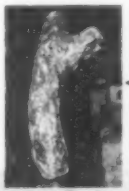


SOLAR BUILDS NEPTUNE NACELLES

Gleaming interior of a stainless steel engine nacelle for a Lockheed P2V-5 Neptune being worked over by Solar Aircraft Co., San Diego, employes. This job marks further diversification of Solar's product lines. And it is an unusual application of the material for this type of aircraft component, which ordinarily is fabricated of aluminum. The extremely hard stainless steel material posed numerous fabrication problems. But Solar says the material provides greater strength at less weight. Nacelle weighs 175 lb.

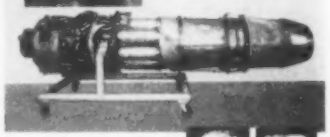
is on the job here...

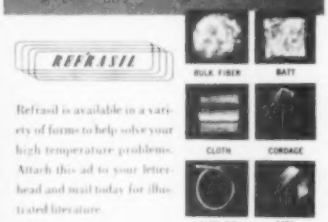
This bolt of flame from the afterburners of the U.S. Air Forces' Northrop Scorpion F-89 is spectacular evidence of the intense heat generated by jet power. Refrasil Blankets are used on the F-89's twin-engines because they are light in weight and are easily removable, as well as high in insulation efficiency. In a blanket thickness of one half inch, a temperature drop of approximately 900° F. is accomplished! These are reasons why Refrasil Lightweight Removable Insulation Blankets are specified by 90% of jet aircraft makers.



Refrasil Insulating Blanket installed preformed on the J-35 Turbojet engine's air bleed manifold lines.

Refrasil Insulating Blankets installed on the air bleed manifold lines and afterburner of the J-35 Turbojet engine.





Refrasil is available in a variety of forms to help solve your high temperature problems. Attach this ad to your letterhead and mail today for illustrated literature.

WRITE OR CALL YOUR NEAREST REPRESENTATIVE:

EASTERN: Fred W. Muhlenfeld, 6659 Loch Hill Rd, Baltimore 12, Md. Valley 3135

TEXAS, OKLA. & KANSAS: Thompson Engineering Service, 700 Hemphill St, Fort Worth 4, Texas, Fortune 5340

MIDWEST: Burnie L. Weddle, 3219 West 29th St, Indianapolis 22, Ind. Hickory 8483

HITCO

THE H. I. THOMPSON COMPANY
1731 CORDOVA STREET
LOS ANGELES 7, CALIF.

THEY FLY *Faster... Farther... Higher...* with

MAGNESIUM

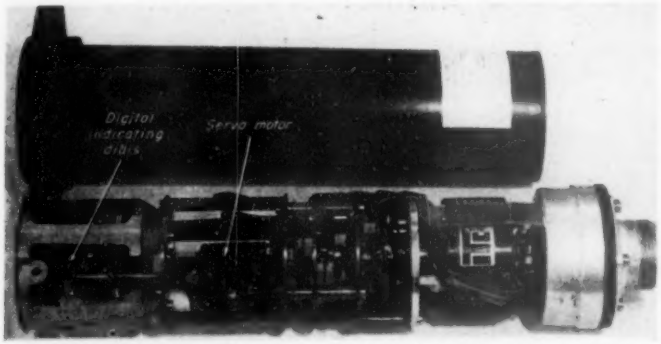
More payload! That's what modern aircraft design demands—and that's why magnesium, the world's lightest structural metal, finds ever increasing use in air transportation. One-third lighter than the next lightest structural metal, it cuts important pounds off weight, without sacrificing strength. As a result today's bomber covers greater distances, at higher altitudes and increased speeds—with more payload!

In addition to its lightness, magnesium is easily fabricated. All forms of fabrication may be used: castings, forgings, extrusions, sheet and plate. In many cases, magnesium is actually the lowest cost metal since it permits noteworthy economies in fabrication.

Wherever a product is made to be moved or lifted, magnesium should be investigated. A vital metal in air transportation today, it offers even greater design improvements for tomorrow. Keep your eye on magnesium if your aim is light weight.

THE DOW CHEMICAL COMPANY
Magnesium Department • *Midland, Michigan*

New York • Boston • Philadelphia • Atlanta • Cleveland
Detroit • Chicago • St. Louis • Houston • San Francisco
Los Angeles • Seattle
Dow Chemical of Canada, Limited, Toronto, Canada



500,000-FT. ALTITUDE isn't easy to measure, as indicated by the complexity of Eclipse-Pioneer division's new altimeter panel indicator.

AF Testing Avionic Altimeters

Pirani type gauge, ionization used by Pioneer in developing above-140,000-ft. measuring units.

By Philip Klass

With aircraft operating altitudes soaring higher and higher, Air Force is looking to avionics to solve its height-measuring problems. At 25 miles and up, the old standby, aneroid-type altimeter, just doesn't have the air to operate effectively.

Two new types of altimeters (one for 140,000-to-300,000-ft. range, the other for 300,000-to-500,000-ft. range) have been developed by Eclipse-Pioneer division, Bendix Aviation, under contract with the Wright Air Development Center. Experimental units are currently under test by the National Bureau of Standards. While their present indicated accuracy is not sensational, their development indicates a start on the problem.

But the aneroid-type altimeter isn't giving up the ghost easily. Recent improvements have upped its operating range to 80,000 ft. And if a dual bellows arrangement is given an avionics assist by a servo system to relieve bellows load, the aneroid type is usable up to 150,000 ft. Beyond 150,000 ft., the aneroid-type altimeter gasps for air.

▶ **Low High-Altitude**—To measure altitude between 140,000 and 300,000 ft., Eclipse-Pioneer has used what is basically a Pirani type gauge. It operates on the principle that as air density decreases, cooling due to air convection currents decreases proportionately.

The principle is applied in a sensing element which is housed in a glass tube approximately the size of a standard miniature vacuum tube. Unlike a vacuum tube, the sensing element is vented to the atmosphere (static line).

Inside the glass tube is a resistance element which is heated by passing electric current through it. The hot element is surrounded by a metal shield which limits heat dissipated by radiation. Because of this radiation shield, the temperature of the resistance element will depend upon convection cooling within the tube which is in turn dependent upon the density of static air vented to the tube. Thus the change in resistance of the heating element in the tube is a measure of the change in barometric altitude.

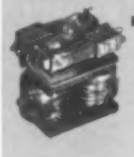
▶ **Dual Sensers**—The convenient relationship between barometric pressure and resistance assumes that heater current and ambient temperature remain constant, which they don't. So, to compensate for these unwanted variables, Pioneer uses a dual sensor arrangement.

The sensor previously described forms one leg of a resistance bridge circuit; another leg is formed by an identical unit which is sealed instead of being vented to the atmosphere. Thus ambient or current changes in one sensing tube are compensated for by corresponding changes in the other, allowing barometric pressure to be the sole variable.

The resistance bridge circuit is self-balancing, by means of a servo system. The servo motor is located in a 2-in. diameter panel indicating instrument and drives a digital (counter) type of

THERE'S A REASON WHY *
Electrical Products
AIRCRAFT RELAYS
ARE UNSURPASSED IN QUALITY AND PERFORMANCE!

*High resistance to shock, vibration and acceleration!



RELAY BASIC UNIT A-1105. Has rotary armature with unique, close-coupled contact linkage for speedy, low-inertia operation specially designed for exceptional resistance to vibration, shock and acceleration. This unit is basic part of relays below.

Hermetically-Sealed
A-N APPROVED TYPES

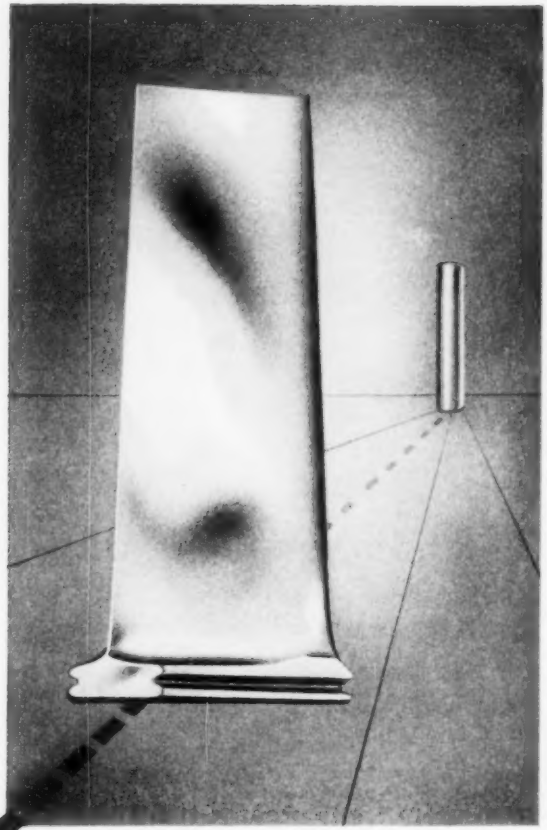
RELAY A-1104 (AN-3306-1). Has RS-06-20-7P Cannon connector mounting. 24V DC. Dimensions: 1-3/4" x 1-3/4" x 3-7/16". 10 Amp. DPDT.

RELAY A-51-188 (AN-3311-1). Suitable for base or panel mounting. 24-28V DC. 2-1/2" x 2-1/2" x 2-1/16". 10 Amp. DPDT.

RELAY A-1106 (AN-3307-1). Is arranged for panel mounting. 24V DC. 1-3/4" x 1-3/4" x 2-7/8". 10 Amp. DPDT.

Electrical Products Aircraft Relays are being specified today by leading aircraft manufacturers for many vital control circuits — in both civil and military aircraft. The result of more than a decade of intensive development, these Relays are leaders in their field of application. It will pay you to investigate Electrical Products Aircraft Relays, as they offer an unusual combination of rugged design features, exceptional performance — and a test life frequently many times that specified! Send us your inquiry, with complete details, or write for our illustrated 10-page Relay Brochure.

RELAY DIVISION
Electrical Products corp.
1100 N. Main Street, Los Angeles 12, California



UTICA HELPS

BY SPEEDING STEPS BETWEEN BAR STOCK AND BLADE

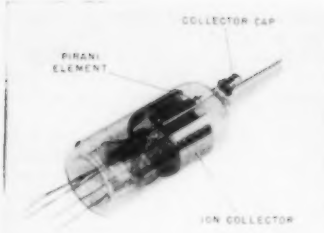
Every military supplier has a *special* war to win. He must win his own race against his enemy counterpart.

As primary suppliers of forged turbine and compressor blades to the aircraft industry, UTICA is going at top speed. But that *alone* is not good enough – not for *this* race.

So we at UTICA examine our methods, study them, modify them, improve them. We seek always to speed, shorten and eliminate steps between bar stock and blade.

The job must be done today, for today is soon tomorrow. Tomorrow's method will not wait until the day after – not at UTICA.

UTICA DROP FORGE & TOOL CORPORATION, Utica 4, New York



IONIZATION-TYPE sensing unit is used to measure altitudes up to 500,000 ft.

PRESSURIZED CONSTRUCTION is necessary in new altimeter amplifier.

indicator instead of the conventional altimeter pointer(s).

Weighing about 5 lb., the system includes a sensing unit containing the two tubes, or a small amplifier, and the panel indicator.

▶ **Accuracy**—The new low high-altitude device is expected to give errors of no more than ± 5,000 ft. at 140,000, and ± 20,000 ft. at 300,000, with proportional errors between these extremes.

▶ **High High-Altitude**—The air density within a vacuum tube which is frequently referred to as a "vacuum" corresponds roughly to the density of air at 300,000 feet, the lower portion of the range where the high high-altitude altimeter must operate. To measure these kinds of air densities, Pioneer has used an ionization-type sensing element.

The unit functions on the principle that when a gas (such as air) is bombarded with a constant stream of electrons, the gas is decomposed into positive and negative ions. The number of ions so formed is proportional to the gas pressure or density—and hence to barometric altitude.

▶ **Sensing Element**—An ordinary power-triode type of vacuum tube, vented to the atmosphere, could be used as a sensing element, although Pioneer has designed a special triode for this application. But the triode is connected in unconventional fashion. Its grid operates at a positive potential and its plate at a negative potential.

When the sensing tube filament is heated, its cathode emits electrons which bombard the positive potential grid. This ionizes the air particles (vented from the static line) which sur-

if you are building missiles

We are supplying six missile manufacturers with a special disconnect fuel coupling. It has approval for liquid oxygen, alcohol and mixtures. It can be made for hydraulic applications, as well as fuels or gases and is designed to withstand high pressures. Its positive action prevents mechanical failure which has frequently caused mis-direction in the past.

Write Today!

Please give security rating (secret, confidential or restricted). If not cleared for security, please do not inquire.

Exclusive Distributor

AIR ASSOCIATES

TETERBORO—216-222 Union St., Hackensack, N.J.
CHICAGO—5315 West 63rd Street
DALLAS—3214 Love Field Drive
GLENDALE—1231 Air Way
MIAMI—P.O. Box 141, Int'l Airport

Wiggins

Manufactured by Aircraft Division
E. B. WIGGINS OIL TOOL CO., Inc.
3424 E. Olympic Blvd.,
Los Angeles 23, Calif.

PIONEER CAST ALUMINUM PLATE & BARS

*PIONEER PLATE **formula 921**

*Copyright Applied for 1952

precision machined for

JIGS, FIXTURES, TABLES, FORM BLOCKS, MASTER TOOLING, DIES, etc.

- Light, easy to handle, high machineability
- High stability
- Low co-efficient of expansion
- Fine grain structure
- Tensile strength 20,000 to 30,000 P.S.I.
- Elongation 1/2% to 1 1/2% in 2 inches

Standard plate sizes 48" x 96", 48" x 144". Bar sizes up to 8" x 12' (machined 4 sides). Larger and smaller sizes to order.

WRITE FOR CATALOG detailing characteristics, advantages, sizes, etc., of Pioneer Cast Aluminum Plate Formula 921.

PIONEER TOOL ENGINEERING, INC.
12901 YUKON AVENUE, HAWTHORNE, CALIFORNIA

Russell & Company
6432 Cass Ave., Detroit
10 South Union Street, Bay Shore, Long Island
426 Transportation Bldg., Cincinnati
127 Crosby Avenue, Buffalo 17,
H. L. Hutchinson
140 N. E. Broadway, Portland
Lyons-Coleman, Inc.
P.O. Box 6028, Dallas 1, Texas

SPECIALISTS IN CAST ALUMINUM TOOLING PLATE AND ALUMINUM MACHINING

Pushing back frontiers...

calls for better materials and methods... faster, more efficient figure production!

As frontiers move back, materials and designs are being developed to withstand the new speeds, stresses, and temperatures.

Calculation plays a vital role in these achievements. And the maximum versatility, speed and accuracy are found in the Remington Rand *Printing* Calculator. Short-cut multiplication, automatic division, split-second addition and subtraction, plus proof of accuracy *printed on the tape*—are truly pushing back the frontier in figure production.

Send for complete details today. Write Remington Rand Inc., Room 2060, 315 Fourth Avenue, New York 10, N. Y.

The Remington Rand *PRINTING* CALCULATOR

Remington Rand

315 FOURTH AVE., NEW YORK 10, N. Y.

round the grid. The resulting positive ions are attracted to the negative-potential plate. If the cathode to grid current is maintained constant, the plate current is proportional to barometric altitude.

The ionization current is balanced out by a reference current generated by a small servo system which positions a digital counter in the panel indicator to show an altitude proportional to the ionization current.

►**Warm-Up Problem**—Because it is vented to the atmosphere, the sensing element heater filament would quickly oxidize and burn out if it was operated at low altitudes. To prevent this, Pioneer has built a Paran-type gauge (low high-altitude) into the high high-altitude sensor. The Parani gauge simply functions as an on-off switch to energize the filament of the sensor when a sufficiently low air density (slightly under 300,000 ft.) is reached.

Pioneer engineers indicate that the unit should better AF specs which require an error of no more than ±20,000 ft. at 300,000, and ±60,000 ft. at 500,000 ft. The unit weighs approximately 13¼ lb. in its present form, and consists of the sensor, indicator, and amplifier.

Microwave Units Are Lightweights

A line of specialized microwave components for use in radar and telecommunications and microwave research has been announced by General Precision Laboratory, Inc., Pleasantville, N. Y. Typical new units are a lightweight, high-efficiency waveguide switch; a compact "twist and turn" elbow, and improved broadband shunt and series tees.

According to the manufacturer, the new units have low absorption and reflection losses over a 10% bandwidth. Aluminum construction is used to minimize weight for airborne applications. All units are usable in pressurized systems.

The microwave switch presents a maximum voltage standing wave ratio of 1.10 in the switched positions, with a maximum ratio of 1.50 during the switching process. Cross attenuation

SPEED!

1800 insulated wire terminations per hour!

THE FASTEST MOST ECONOMICAL WAY TO APPLY TERMINALS TO WIRE IS TO USE AMP AUTOMATIC MACHINES WITH AMP PRE-INSULATED* CORROSION PROOFED TERMINALS!

No capital investment for machinery! You can make as high as 1800 complete, uniform, INSULATED terminations per hour. Connections are noise free, vibration proof, give extreme resistance to salt spray, and meet all other standards and approvals required for the most simple or the most critical applications in all kinds of electrical circuits.

For hand tool application: AMP CERTI-CRIMP* tools are gauged to ±.003" to insure precision crimp. Tool and terminal are dot and color matched. Jaws will not release until proper crimping pressure has been reached.

AMP

AIRCRAFT-MARINE PRODUCTS, INC.
2100 Paxton Street, Harrisburg, Penna.

In Canada: ONTARIO, R. M. HUTCHESON, 10 Nordale Crescent, Hardington, P.O. Toronto 15, Elgin 5647
QUEBEC, BRUCE C. WALLACE, 3275 Linton Boulevard, Apt. 9 Montreal, Belair 8345

*Trade-Mark
AMP Trade-Mark Reg. U.S. Pat. Off.

Designed-
to specification

These cable and connector assemblies have been developed by Amphenol to meet specific needs. Electronics is the world's fastest growing industry and as new products, equipment and uses are developed, new application problems also arise. Over 75% of the better than 9,000 items in the Amphenol line were developed to meet a specific need or to solve a new problem.

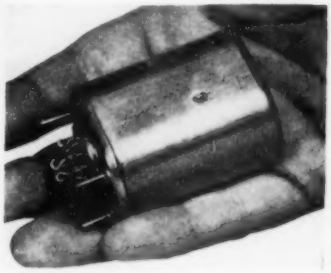
Amphenol's staff of engineering specialists is always available to investigate your problem and to make recommendations for solving it.

The chances are that some item already manufactured by Amphenol is just what you need. Write today for General Catalog B-2.

AMERICAN PHENOLIC CORPORATION
1830 SOUTH 54TH AVENUE • CHICAGO 50, ILLINOIS

varies from −25 to −40 db. over a 10% bandwidth. The block switch, including motor, weighs 6 ounces.

The General Precision Laboratory "twist and turn" elbow provides both a bend and a modal rotation through 90 deg., in a unit which the manufacturer says is no larger than a 90-deg. bend alone. The new unit is said to replace two separate components and additional waveguide length previously used for this function.



Aircraft Relay Is Nitrogen Filled

A new 28-volt d.c. hermetically sealed aircraft relay weighing less than 5 oz. has been announced by General Electric. The new relay is a 4-pole, double-throw unit with contact carrying capacity of 3 amps at either 28 v. d.c. or 15 v., 400 cps.

GE says the new relay meets or betters military spec MIL-R-6106. They claim long life for the relay because of its nitrogen-filled construction, its beryllium-copper contact fingers, silver contacts, and corrosion-resistant construction.

Added information may be obtained by writing for bulletin GEA-7529, General Electric Co., Schenectady, N. Y.

Null-Type Indicator Takes Rough Handling

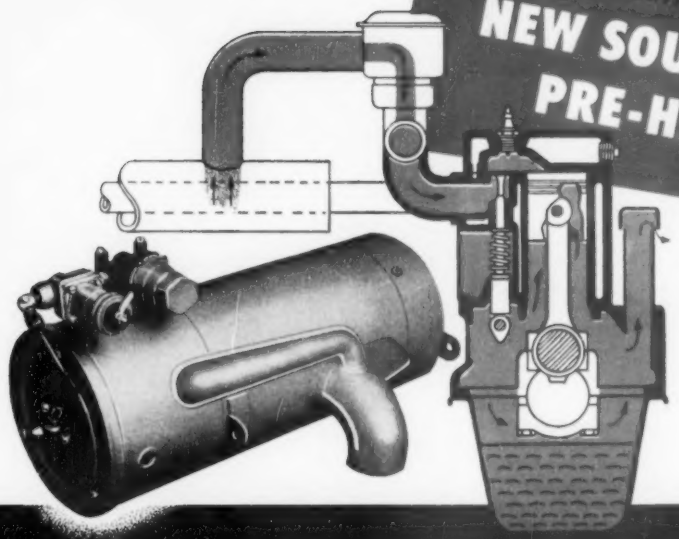
A hermetically sealed null-type d.c. indicator designed to take rough handling has been announced by Marion Electrical Instrument Co. The manufacturer says that center-point scale sensitivities up to one microamp per mm. are available in the new indicator. The meter's construction is said to provide logarithmic attenuation of the center-point sensitivity as the needle departs from null position thereby providing overload protection of 10 times full-scale current.

The units come in 2½- and 3½-in. diameters and are available in a variety of current sensitivities and internal resistance characteristics.

Marion Electrical Instrument Co., Manchester, N. H.

Another South Wind first!

NEW SOUTH WIND PRE-HEATER



Makes quick engine starting possible

—even at 65° below!

Meets All The Latest Military Requirements

Now solved—by South Wind and this new South Wind Pre-Heater—the problem of quick engine starting at temperatures of 65° below!

The Answer is pre-heating...with clean, non-corrosive heated air applied *directly* on frictional parts *inside* the engine! This system—perfected by South Wind—also heats the lubricating oils. Assures faster, more efficient warm-up of critical parts than any indirect method of transferring heat through coolant and cold engine walls!

Resistance to cranking power is minimized. The engine is cranked with warm parts and warm lubrication. *Only clean heat* is used to raise the temperature of induction air (on either Diesel or gasoline engines). This factor assures normal and reliable ignition . . . for quick, sure starting under cold conditions.

Equally effective on either liquid or air cooled engines, this new South Wind model burns liquid fuel, can be operated automatically or manually. Small in size. Light in weight. It can be easily, quickly installed on practically any type of engine.

Check these exclusive advantages! Only South Wind offers them all in this new method of engine pre-heating

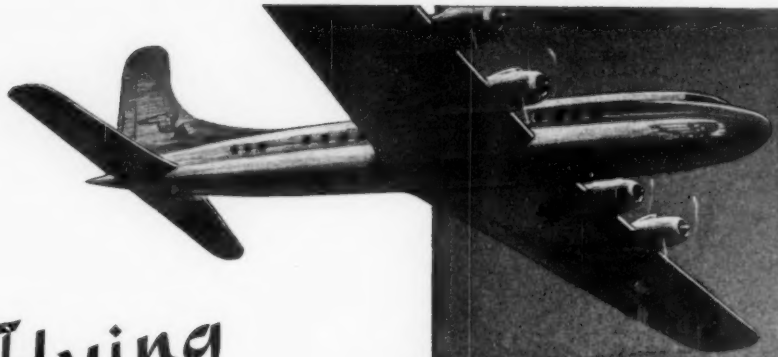
1. **Quick, easier starting at —65°F.**
2. **Conforms to latest military requirements.**
3. **Adequate lubrication at all times.**
4. **Lower maintenance cost.**
5. **Longer engine life.**
6. **No interrupted service.**

Now At Your Disposal. A staff of experienced South Wind Field Engineers is available to assist you with your specific preheating or heating problems. Write today for their help in adapting this or any other model in the complete South Wind line of heaters for commercial, military or civilian aircraft. South Wind Division, Stewart-Warner Corporation, Dept. G-12, 1514 Drover St., Indianapolis 7, Indiana.

A PRODUCT OF SW STEWART WARNER

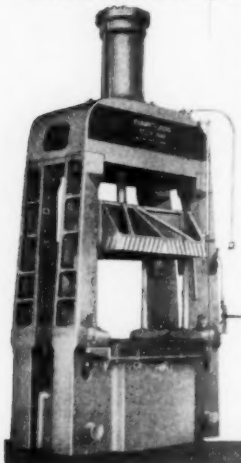
South Wind

AIRCRAFT HEATING AND THERMAL ANTI-ICING EQUIPMENT INERT GAS GENERATORS



Flying Stampings

STAMPINGS made on the Chambersburg CECOSTAMP are used extensively in the fabrication of the modern airplane. Cecostampings comprise such sheet metal components as cowlings, wing fairings and fillets, bulkheads, gussets, ribs, instrument panels as well as stainless steel firewalls, exhaust manifolds, heat exchangers and the various sheet metal parts for jet engine assemblies.



Cecostamping is forming by impact, at controlled velocities, between a mating punch and die. The free metal flows in the direction of least resistance, arranging the grain fibres according to structural requirements. Cecostamping also sets hard-to-form alloys to shape (which only impact can do). Write for a copy of an informative article "Using the CECOSTAMP in Aircraft Production" and Bulletin 30-L-0.

CHAMBERSBURG ENGINEERING CO.
Chambersburg, Penna.

CHAMBERSBURG
CECOSTAMP

FACTS FOR FILING

Jet Engine Types

Aircraft engines for jet propulsion are divided into two basic classes: Air-breathing and non-air-breathing. Air-breathing engines can be further classed by the type of compression used, either mechanical or aerodynamic.

These are the current air-breathing engines with mechanical compression:

• **Turbo,** which uses either a single-stage centrifugal compressor or a multi-stage axial compressor. Compressed air is then mixed with atomized fuel and the mixture burned. The hot gases rush out through a single-or multi-stage turbine—which absorbs enough power to drive the compressor—and exhaust through a nozzle to atmosphere.

• **Turbojet with reheat,** which is a turbojet of any type to which an afterburner has been added. Function of the afterburner is to increase thrust of the engine by a large amount, up to 100% in some cases. And it does this by adding additional fuel downstream of the turbojet turbine, burning the mixture of fuel and gases and exhausting through a nozzle to atmosphere.

• **Turboprop,** which is a turbojet with main shaft extended through gearing to drive a conventional propeller. In this case, the turbine must absorb enough power to drive both compressor and propeller, and therefore there is very little direct exhaust thrust available for pure jet propulsion.

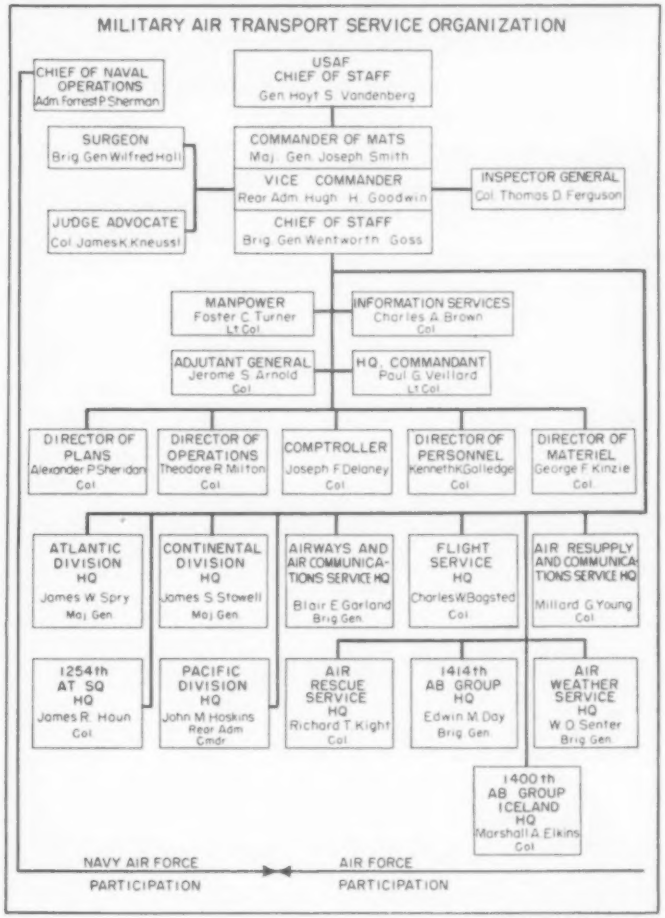
• **Ducted fan,** which is basically a turboprop engine operating in a tunnel. The basic engine drives a fan of short blade length and high solidity which operates in an annulus surrounding the turbojet. Air enters the annulus and is diverted, part to the turbojet and the rest through the fan. The diverted streams meet again at the exit, which is two concentric nozzles. The inner nozzle spews out the hot exhaust from the inner turbojet; the outer annular nozzle exhausts the air which has gone through the fan. Advantage is higher speed limitation than turboprop, lower fuel consumption than turbojet.

These are current air-breathing engines which use aerodynamic compression:

• **Ramjet,** which takes air in, compresses it by simply shoving more air in behind that air (which results from the motion of the ramjet through the atmosphere) and injects fuel into it. After mixing, burning takes place in a combustion chamber and the hot gases blast out of a nozzle. Ramjets are able to produce thrust at sub- or supersonic-speed, but should be designed with specific speed ranges in mind. Advantage is tremendous thrust for little weight; disadvantage is sensitivity to changes from design conditions, and necessity for initial launching by rockets or other means to produce sufficent speed for aerodynamic compression.

• **Ducted rocket,** which is basically a ramjet. In this engine, a small rocket motor is surrounded by the conventional ramjet layout. Rocket acts to provide initial thrust at zero forward speed (where there is no aerodynamic compression) and to augment thrust of ramjet engine. Advantage is static thrust; disadvantages are structural and design difficulties.

The only current jet engine which does not breathe air is the **rocket.** Here there may be class subdivisions, depending on the fuel used. But basically, all rockets are the same. They burn a fuel in the presence of some oxygen-carrying material, and blast the exhaust through a supersonic nozzle into the atmosphere. Fuels may be solid or liquid. Advantage is that rocket can work where there is no air, can deliver great thrust for tiny weight. Disadvantage is astronomical fuel consumption. *Aviation Week, 4-21-52*



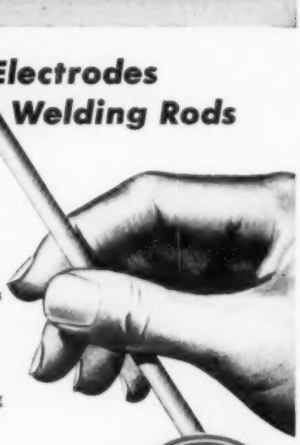
Aviation Week, 4-21-52

This page is a reference service to help you. If you'd like to see certain reference data, write: The Editors, Aviation Week, 330 West 42 Street, New York 36, N. Y.

an ACCO product

for Stainless Steel WELDING

AC-DC Electrodes
GAS Welding Rods
made by
PAGE



BURNING • stable even at lower heats
SLAG • clean, easily removed
COATING • resists cracking down to very short stubs
SELECTION • complete line for welding every type of stainless

ACCO
Get in touch with your PAGE distributor

PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Portland, San Francisco, Bridgeport, Conn.

PAGE Welding Electrodes AND Rods

NOW AVAILABLE!
STAINLESS STEEL
AN FITTINGS

ONE of Ohio's most modern and advanced Screw Machine Establishments is now prepared to supply Aircraft Fittings in all types of Stainless Steels.

• • •

Capacity available for assemblies and components from 1/32" through 3½" diameter in stainless as well as ferrous and nonferrous materials.

Z & W MACHINE PRODUCTS, INC.
5100-16 & 5151 St. Clair Avenue
CLEVELAND 3, OHIO
Phone EN 1-1991

LETTERS

Jato for Airliners?

. . . A non-pilot asked me, "Why don't they put Jato units on transport type aircraft?" . . . The extra margin of safety which such an installation would give a pilot seems so self-evident to me that I cannot believe it hasn't been thought of before. . . .

A brochure showing a new Esso executive DC-3 has just come across my desk, and I was interested to see that it is equipped with Jato.

W. A. H.
New York, N. Y.

Simplifying Aviation

Congratulations to Capt. Robson on his very pointed article Mar. 10 on "We Must Simplify Aviation." His views, I am sure, have wide backing. The few examples outlined should serve notice to all engaged in flying that it is time to seriously consider whether the constant changes in regulations and standards should be continued in the interest of standardization at the expense of safety. . . .

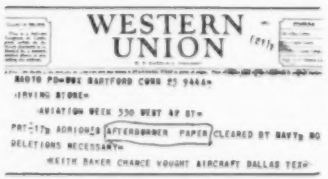
Howard J. Graninger
6319 25th St., North
Arlington, Va.

Woops! He's Wrong

. . . In my opinion, through the joint efforts of Aviation Week and H. O. Adrion (Jan. 28 issue), the Russian air intelligence organization could have been reduced by a significant number of agents.

It is my understanding (refreshed by constant reminders in the form of official memoranda) that all turbojet engine thrust augmentation devices are still classified by the Department of the Air Force as either confidential or restricted.

American research organizations have expended considerable effort and tremendous


WESTERN UNION

RADIO PD=RWX HARTFORD CONN 23 944A=
SERVING BTDBE=
AVIATION WEEK 330 WEST 42 ST=
PAT-217b ADRIONB AFTERBURNER PAPER CLEARED BY NAVY& NO DELETIONS NECESSARY=
KEITH BAKER CHANCE VOUGHT AIRCRAFT DALLAS TEX=

sums of public funds developing these devices and it seems highly imprudent to discuss the results publicly merely to permit one individual the prestige of presenting the first paper published concerning the subject.

Many of the persons engaged in the research and development of our turbojet engines have been desirous of publishing their results in unclassified journals but have necessarily deferred to the propriety required by our national defense or have been restrained by laws governing dissemination of classified information, only to be scooped by persons who are not directly restrained by security regulations. . . .

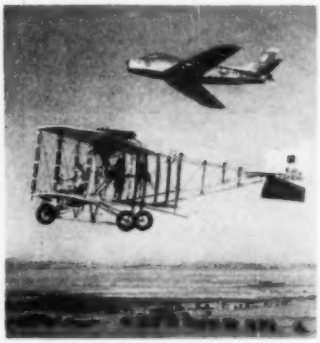
Serious consideration of the problem

makes it incumbent upon me to protest in the name of the security of the nation at a time when this security is apparently so vitally deficient. Although AVIATION WEEK has done lip service through recent articles to security regulation of its published articles, the reference article fails to support this contention.

I am currently engaged in research with the NACA and am a Reserve officer in military intelligence, USAR. For these reasons I request that my name be withheld from any publication.

J. U.

(Reader U. is being sent a photostat of the telegram reproduced here. He should complain to security review officers of the Navy and Air Force. AVIATION WEEK runs more cleared stories than some readers apparently realize.—R. H. W.)



Look Who's Ahead

They poke a lot of fun at the slow-flying early day "crates" but please note which aircraft is leading in the photo.

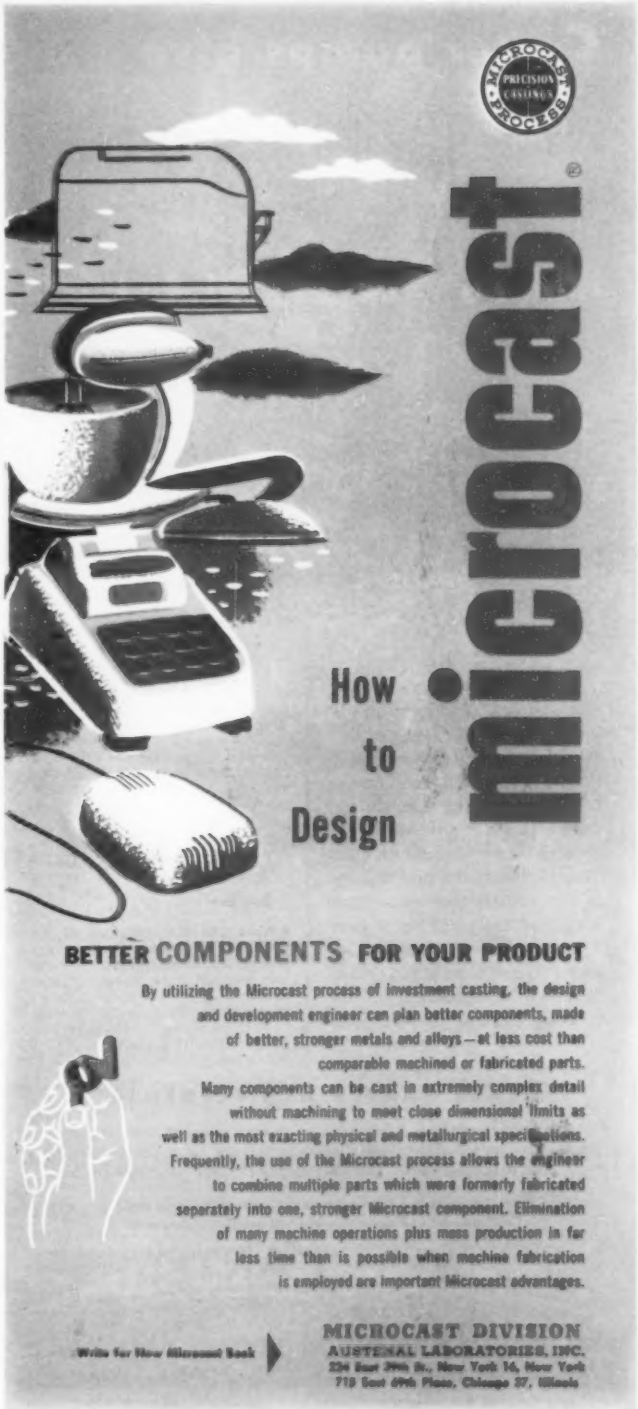
The picture of a Sabre jet and a 1912 pusher biplane was released by North American in connection with a recent celebration. Parker's plane weighs 1,075 lb. and cruises at 60 mph.

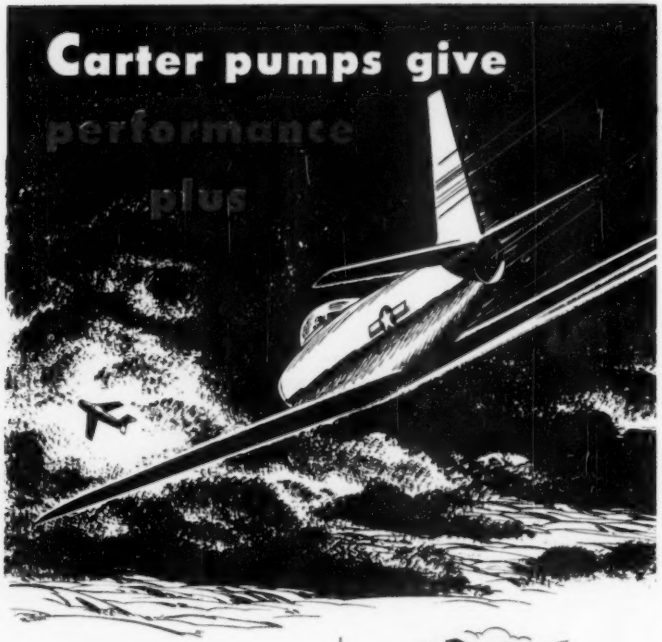
HOWARD WALDORF, Manager
Aviation division
Oakland Chamber of Commerce
Oakland 12, Calif.

Air Armament

I was interested by your article, "AF Sets Armament Procurement Policy," in the Jan. 14 AVIATION WEEK. Our organization was formed in August, 1950, on a basis almost identical with that outlined in Air Force Regulation 136-1 referred to in your article. In the apparent effort of the news writer to play up the Oerlikon Co., no effort has been made to verify the fact that the Air Force's "new" policy can be easily carried out by existing organizations in this country. The following paragraphs are quoted directly from the basic policy of our organization:

> "During the years following World War II, as armament design became increasingly complex, the impracticability of designing weapons systems


MICROCAST PROCESS
PRECISION CASTINGS
Microcast
How to Design
BETTER COMPONENTS FOR YOUR PRODUCT
By utilizing the Microcast process of investment casting, the design and development engineer can plan better components, made of better, stronger metals and alloys—at less cost than comparable machined or fabricated parts.
Many components can be cast in extremely complex detail without machining to meet close dimensional limits as well as the most exacting physical and metallurgical specifications.
Frequently, the use of the Microcast process allows the engineer to combine multiple parts which were formerly fabricated separately into one, stronger Microcast component. Elimination of many machine operations plus mass production in far less time than is possible when machine fabrication is employed are important Microcast advantages.
Write for New Microcast Book
MICROCAST DIVISION
AUSTENAL LABORATORIES, INC.
22d East 39th St., New York 16, New York
719 East 69th Place, Chicago 37, Illinois



North American's F-86-D Sabrejet is a most formidable interceptor in the hands of Air Force pilots noted for spring steel minds, infinite skill, and ingenuity. The General Electric jet engine gets a big power boost through the use of an afterburner. The performance and agility of this substratosphere fighter hinges on the ability of a tiny 4-pound pump to unfailingly deliver a large volume of fuel under extremely high pressure. A Carter designed pump does this job.

DOUGLAS D-558-2. Once this plane drops from the belly of its mothership, the herculean task of supplying fuel and liquid oxygen to the four ravenous rocket engines is entrusted to Carter turbine-driven centrifugal pumps.

AERIAL GAS STATION. One of the problems of intercontinental flight was solved when in-flight refueling was proved practical and safe. Carter designed and manufactured pumps assure the successful transfer of fuel from the aerial tankers to many of today's aircraft.

OTHER CARTER ACHIEVEMENTS

The Carter trademark is increasingly significant where special-purpose fuel valves are demanded. Typical developments are: •fuel pressure limiters •fuel tank relief valves •pressure fueling adapters •fuel flow limiters.

Carter ingenuity and experience are available to you in the design, development, and manufacture of fuel-handling components.

2-403

CARTER

Tomorrow's Pumps—Today

THE J. C. CARTER COMPANY

253 No. Fair Oaks Avenue, Pasadena 1, California

by combining components developed by separate organizations became glaringly evident. The purpose of all military armament is to provide the maximum destructiveness with the minimum expenditure of men and material.

"The concentration of aircraft manufacturers on the design of maximum performance airplanes and of ordnance designers on the most efficient guns and rockets did not necessarily lead to an optimum weapon when the resulting components were combined. The formation of the Weapons Systems Evaluation Group showed that the Armed Services were well aware of this situation and had taken positive action to coordinate weapons development within their own sphere. In the supporting industry, however, no such consolidation of activity has yet taken place.

"The engineers who now form the nucleus of Aircraft Armaments, Inc. had realized this industrial lack for some time and decided that immediate direct action was essential to assure the Armed Services an industrial equivalent of the Weapons Systems Evaluation Group.

"As a result, Aircraft Armaments, Inc. has assembled in one organization a highly qualified group of engineers with the special experience and abilities required to handle weapons design as a single problem. No other engineering or manufacturing organization now exists which concentrates solely in the armament field. All present companies designing or manufacturing armament are either specialists in some particular weapons component (aircraft computer, missiles, etc.), divide their interests among many activities, or include a minor organizational subdivision for armament design. Aircraft Armaments, Inc. therefore fills a very evident gap in the industrial structure supporting the Armed Services' procurement."

There is therefore available an American organization staffed by American engineers and financed by American capital which is in a position to fulfill the necessary requirements for integration of the armament design field for the Air Forces. To the best of my knowledge, Oerlikon America, though headed by an outstanding ex-Air Force general officer, does not have yet available in the United States an engineering organization in-being equivalent to that now available in this field, not only at Aircraft Armaments, Inc., but at several other American organizations of proven ability.

Though Oerlikon Switzerland has an outstanding reputation, the ability of Oerlikon, in the United States, to develop systems including both the airplane and its armament is as yet unproven. I would suggest closer study by your staff of the activities of development organizations in the United States.

JOEL M. JACOBSON,
Vice-President & General Manager
Aircraft Armaments, Inc.
4415-17 Reisterstown Road
Baltimore 15, Md.

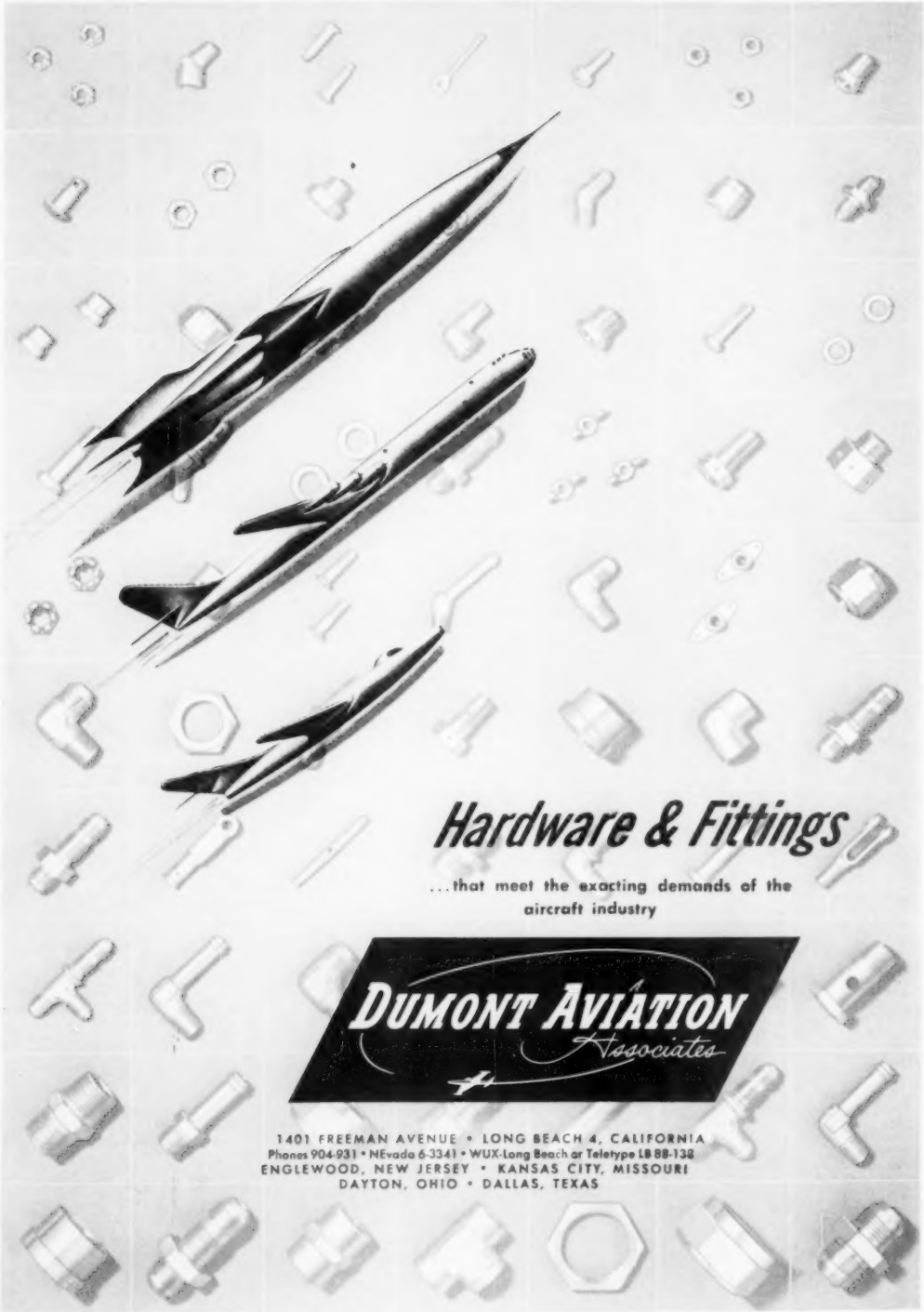
When Decisions are based on Precedent . . .

Precedent — the reservoir of experience. It enabled such great jurists as John Marshall, Oliver Wendell Holmes and Charles Evans Hughes to reach many of their most important decisions. Today, this same principle is equally reliable in business. Applied to your problem of deciding the best source for your aircraft instruments and accessories, precedent will inevitably lead you to Eclipse-Pioneer: Practically every American plane that flies carries Eclipse-Pioneer equipment; Aircraft and engine manufacturers as well as airlines have learned to rely on Eclipse-Pioneer quality; From aviation's earliest days, Eclipse-Pioneer has demonstrated its ability to design and manufacture for both experimental and operational requirements. It is a record unmatched in its field . . . ample precedent for your decision to call on Eclipse-Pioneer.

ECLIPSE-PIONEER DIVISION OF Bendix AVIATION CORPORATION

TETERBORO, NEW JERSEY

Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, N. Y.


Hardware & Fittings
...that meet the exacting demands of the aircraft industry
DUMONT AVIATION Associates
1401 FREEMAN AVENUE • LONG BEACH 4, CALIFORNIA
Phones 904-931 • NEvada 6-3341 • WUX-Long Beach or Teletype LB 88-138
ENGLEWOOD, NEW JERSEY • KANSAS CITY, MISSOURI
DAYTON, OHIO • DALLAS, TEXAS

CAB Rules Out Route Sales in Merger Case

- **Delta offers $2 million for Capital's southern routes, other airlines want to negotiate for purchase.**
- **But the Board has decided to keep such issues out of hearings on the proposed NWA-Capital wedding.**

By F. Lee Moore

Civil Aeronautics Board has ordered Northwest-Capital and National-Colonial merger applications expedited. Each is to be treated as a separate case—apart from complications of the New England-Southern States application for merger.

So Delta Air Lines' latest try to get Capital's southern routes appears to have failed—at least for now. Delta last month made Capital a complex financial offer of what looked like $6 million but turned out $2 million. Then Delta asked the Board to issue a show cause order making the Northwest-Capital merger contingent upon transfer of Capital's Routes 55 and 51 to the proposed Delta-Northeast merger.

▶ **Other Offers**—Braniff and Mid-Continent have asked Capital to negotiate for sale of the same routes. Chicago & Southern, Delta and Northeast asked CAB in the Northwest-Capital merger case to consider transfer of the routes to them.

But after a month's deliberation over the Delta offer and motion, CAB decided to keep the Northwest-Capital merger case simple. The Board will not allow Delta or any other line to bring into the Northwest-Capital case the question of the acquisition of Routes 51 and 55.

Main hope interested airlines have this summer is to convince CAB that Capital's southern routes should not be a part of the Northwest-Capital merger. If they achieve that, and the merger goes through, then CAB and Northwest-Capital will consider who shall get the routes and what shall be the price.

Delta has submitted a firm bid, and Capital has analyzed it.

Here is an analysis of the financial aspects of a sale of Capital's southern routes, which is considered a possibility within the year:

▶ **Delta's Offer**—On Mar. 11, Delta issued a press release announcing "for the first time details of efforts to purchase Capital's Routes 51 and 55 for a sum 'substantially' above $4 million in cash, including the southern routes and part of the physical assets of Capital."

Delta did not make details of its "offer" public; but Delta did send copies to the five members of CAB. The terms:

- **$6,006,075** cash to "Capital and or to the surviving corporation of your merger.
- **"In exchange for:**

"1. The transfer to us of Routes 51 and 55; and

"2. The transfer to us of other assets of Capital having an aggregate value on Capital's books (maintained on a consistent basis and substantially in accordance with sound accounting principles and with the uniform system of accounts of the Civil Aeronautics Board) equal to 50% of Capital's net book value as of Dec. 31, 1951, usable in the operation of Routes 51 and 55, and including fixed assets at all stations on these routes which are not also on some other of Capital's routes.

"In the event that it is not feasible for you to transfer assets aggregating at book value 50% of Capital's net book value, as referred to above, the purchase price would be reduced by an amount equal to the difference between such 50% and the book value of assets actually transferred."

▶ **Delta Offer Analyzed**—Qualified observers analyze Delta's offer (in terms of Capital's Dec. 31, 1951, balance sheet, cited as the asset valuation in Delta's offer):

- **Delta offered,** in effect, $2,050,208 for the route franchise.
- **Delta also required** that Capital sell the station facilities serving the route exclusively—at book value. That is estimated at $855,000. So the Delta offer of Mar. 6 comes to $2,155,208 for Capital Routes 55 and 51 and the station facilities serving them exclusively.
- **The $3,870,867 balance** of the $6,006,075 figure mentioned in the offer and referred to in a Delta press release of Mar. 11 is really a separate offer for Capital flight equipment. It is not a required part of the route purchase deal. It is an optional supplemental offer, according to the interpretation of the Mar. 6 offer confirmed in a letter of Mar. 18 from C. E. Woolman to J. H. Carmichael.
- **Delta offers** this $3.9 million for what amounts to about 41% of Capital's total assets at book value. (The offer is for 50% of Capital's "net book value"—assets less liabilities; this comes to 41% of total book value.)
- **Capital figures** the book value of its total property and equipment assets at $9,760,000. Only $1,660,000 of this is ground property and equipment; $8,100,000 is flight equipment.
- **Delta did not intend** this offer to apply to ground facilities other than those on the routes transferred.
- **So Delta's optional** $3.9-million offer is for about 48% of Capital's transport fleet of 5 Constellations, 24 DC-4s, 25 DC-3s and 3 Super DC-3s as of Dec. 31, 1951.

▶ **Capital Won't Sell Now**—Capital President Carmichael first answered the Delta offer Mar. 13 in a letter to Delta President Woolman. He wrote: "As I have told you on every occasion when this subject was broached, there are many facts and circumstances existing at this time which, in our opinion, do not make it appropriate for us to negotiate for the sale of any of our routes or parts thereof, including Routes 51 and 55. . . . Several other airlines have expressed a desire to negotiate. . . . To each of these other airlines, we have given an answer similar to the ones we have given you."

Northwest and Capital are avoiding all entanglements that might delay CAB action on their merger application. Stockholders vote on it May 19.

As to Delta's specific offers, Carmi-

DC-7s Ordered

Delta Air Lines has ordered four Douglas DC-7s at cost of $7 million, on top of a $6-million order for ten Convair 340s.

The Delta DC-7s will seat 69 passengers and crew of 5. They are scheduled for delivery in early 1954. Delivery of the Convairs is to begin late this year.

The DC-7 will cut Delta's Chicago-Miami time to 3 hrs. 45 min., Delta says—half an hour less than present DC-6 schedules.

chael said both the route bid and the equipment bid were far too low. He said Route 55 earned $1.1 million last year. And present service improvements are increasing that earning power.

As to selling flight equipment at book value, Carmichael said that market value is about 2½ times book value.

Split CAB Decision Hikes Airline Fares

A split Civil Aeronautics Board decision approved the $1 fare raise asked by most domestic trunk airlines, but rejected their plea to end the 5% discount on roundtrip tickets.

Chairman Donald Nyrop and Member Josh Lee favored this compromise.

Members Oswald Ryan and Chan Gurney wanted to end the discount as well as raise fares a dollar.

Member Joseph Adams said the Board shouldn't raise fares at all before making a careful investigation.

Adams said the airlines hadn't shown need for an immediate fare raise. He said so important a decision by the Board should be based on an investigation rather than snap judgment. Adams estimates the $1 raise will add $16 million annually to passenger fare. Eliminating the roundtrip discount would add another $12 million, he says.

The Board majority cited the straight $1 raise on all tickets as an improved price structure because it helps offset higher unit cost of shorthaul operation.

To the airline pleas to end the discount, the Board majority (Nyrop, Lee and Adams) said: ". . . This proposal appears to be for the sole purpose of augmenting earnings of the carriers that presently appear to be at an adequate level. . . ."

Adams cited the following CAB staff summary of trunk airline earnings to back his opposition to the increase: For the 12 months ended Dec. 31, 1951—return on investment of 29% before taxes, 14% after taxes; for the 12 months ended June 30, 1951—return of 25% before taxes and 12% after taxes.

Australia to Buy Jet Airline Transports

(McGraw-Hill World News)

Melbourne—The Australian government is considering a plan to purchase abroad several new heavy aircraft—probably jets or turboprops—for charter to Australian domestic airlines.

De Havilland Comets and Vickers Viscounts are mentioned for the first order.

The government now is certain to remain in the airline business, despite its election promise of desocialization. The government-owned-and-operated TAA is to be maintained, but help would be given to its chief competitor, ANA. Access to new replacement aircraft is given ANA by enabling it to charter modern planes directly from the government.

Private investors were reluctant to finance the purchase of new aircraft for ANA, fearing the airline would be nationalized if the Labor government is returned to power.

Details of the charter agreement are being worked out. Some stop-gap purchases of other planes may be necessary if delivery dates for jet planes are too distant.

Certificate Renewal Is Denied Mid-West

In a move that surprised advocates of local service airline expansion, Civil Aeronautics Board has denied renewal of the certificate of Mid-West Airlines. Observers say this bodes ill for Wiggins Airways, another highly subsidized local carrier up for renewal.

Only last winter, CAB approved purchase of Mid-West by Purdue Research Foundation, which then bought 10 DC-3 transports. And CAB shortly thereafter reopened the North Central case, in which Mid-West sought a route extension from its Iowa area into Chicago.

Mid-West is the second local airline to be dismembered; Florida Airways was the first—three years ago.

CAB Members Josh Lee and Joseph Adams dissented.

Interchange Plans Halted by Court

National Airlines has succeeded in getting U. S. Circuit Court of Appeals, Washington, D. C., to stop the Eastern-Braniff-TWA interchange competitive Miami-West Coast service scheduled to start this month. National contends it did not have a chance to present evidence why CAB should not approve the service.

The court stayed the CAB order approving the service. The court said National's complaint of insufficient hearing presented "a substantial legal issue;" and the court said the stay, pending judicial review, would do no injury to the public interest.

But the carriers say they spent more than $200,000 preparing the service, and already had taken 450 flight reservations on it.

Braniff, Eastern and TWA told the court they planned to file a petition of reconsideration.

Trunkline Carriers List Top Salaries

Three trunkline carriers have reported salaries, stock holdings and bonuses of their top executives and directors during 1951, as show in the following list. Figures for 1950 are in parentheses.

▶ **Caribbean Atlantic Airlines, Inc.**—Dionisio Trigo, president, salary $12,500 and stock holdings of 23,397 common shares ($10,000 and 22,731 common shares); Benigno Trigo, vice president, salary $4,750 and 23,397 common shares ($3,500 and 22,731 common shares); Frank H. Sheldon,

MEXICAN AIRFREIGHT SOARS

Use of airfreight by Mexican firms has doubled over the last year—this photo shows a consignment of 13,000 lb. of textiles being conveyor-loaded into a Compania Mexicana de Aviacion C-46 for rush shipment to Central America. Delivery would have taken approximately a month using surface methods; the plane made it in 4 hr.

vice president-traffic, salary $8,550 and 10 common shares ($8,400 and 10 shares); Jose M. Sierra, vice president-operations, salary $10,750 and 88 common shares ($10,149 and 88 shares); L. A. Lockhart, treasurer, salary $7,950 and 250 common shares ($7,800 and 250 shares); Adolfo Valdes, secretary, no salary, no stock (no salary, no stock); and the following directors: Frank Ballester, 435 common shares (435 shares); Henry C. Molina, 6,500 common shares (6,500 shares); Juan Cabrer, 708 common shares (708 shares); Miguel Fernandez, 1,597 common shares (1,597 shares); Juan Trigo, 17,876 common shares (17,208 shares).

▶ **Capital Airlines, Inc.**—J. H. Carmichael, president and director, salary $44,000 and 4,637 common shares ($40,000 and no stock); R. G. Lochiel, vice president-treasurer, and director, salary $28,600 and 2,715 common shares ($26,000 and 2,000 B debentures); James W. Austin, vice president, salary $26,400 and 6,300 common shares ($24,000 and no stock); J. B. Franklin, vice president, salary $24,750 and 4,600 common shares, ($22,500 and no stock); Robert J. Wilson, vice president and director, salary, $21,780 and 1,500 common shares ($19,800 and no stock); Hayes Dever, secretary, salary $17,050, and 100 common shares ($15,500 and no stock); Charles H. Murchison, chairman of the executive committee, salary $16,500 and 10,300 common shares (no salary and no stock); and the following directors: David L. Frawley, 1,200 common shares (none); D. F. Gruenhagen, 100 common shares (none); George R. Hann, 12,500 4% series A debentures and 40,272 common shares (273,000 B debentures); A. F. Kroeger, 100 common shares (none); B. D. MacIntyre, 200 common shares (none); C. Bedell Monro, 1,125 common and 4,500 4% series A debentures (none); T. D. Neelands, Jr., 2,500 common shares, (100 B debentures); Otto A. Seyferth, 400 common shares (500 B debentures), and J. R. Stockton, 550 common shares (100 B debentures).

▶ **Chicago and Southern Airlines, Inc.**—Carleton Putnam, chairman of the board and director, salary $19,666, bonus $350 and 54,800 common shares (salary $23,999, bonus $200 and 54,800 common shares); Sidney A. Stewart, president and director, salary $34,333, bonus of $350 and 900 common shares ($32,000, bonus of $200 and 900 common shares); Junius H. Cooper, vice president-financial, and director, salary $18,666, bonus of $200 and 100 common shares ($18,000, bonus $200 and 100 common shares); William T. Arthur, vice president-operations, salary $18,166, no bonus and 100 common shares ($17,500, no bonus and 500 common shares); Richard S. Maurer, vice president and secretary, salary $14,666, no bonus and 40 common shares ($13,666, no bonus and 40 common shares); Thomas H. Miller, vice president-traffic and sales, salary $13,666, no bonus and 100 common shares (no report 1950); William T. Beebe, vice president-personnel, salary $13,666, no bonus and 75 common shares (no report 1950); Thomas F. Hambleton, treasurer, salary $8,125, no bonus and 100 common shares ($7,483 and 100 common shares); Robert S. Scrivener, assistant treasurer, salary $5,160 and 20 common shares ($5,160 and 20 common shares); Erma Murray, assistant secretary, salary $4,680 and 50 common shares ($4,680 and 50 common shares); and the following directors: L. Raymond Billett, no salary, bonus of $350 and no stock (bonus of $100 and no stock), and John R. Longmire, bonus of $350 and 9,799 common shares (bonus of $100 and 9,499 common shares).

New Definitions For Skeds, Nonskeds

What is a nonscheduled air transport service and what is a scheduled service? Two recent and official definitions are now available:

▶ **International.** The 57 member nations of the International Civil Aviation Organization have now agreed that a scheduled air service is only scheduled international service when it meets all three of the following tests:

- It flies over more than one state.
- It is common carriage—its flights are all open to the general public at a money rate.
- It flies a route on a published timetable, or so regularly or frequently as to "constitute a recognizably systematic series."

▶ **U. S. Domestic.** The Civil Aeronautics Board cites the U. S. Court of Appeals, Second Circuit, as accepting a CAB definition of Mar. 14, 1947, of domestic nonscheduled operation: Nonscheduled air service between any two points must be:

- Flights "staggered as to the days of the week in successive weeks".
- Flights on different days of the week in successive weeks.
- Some weeks with no flights at all.
- "Such infrequency as to preclude any implication of a uniform pattern or normal consistency of operations. . . ."

The international definition was adopted by the 57 ICAO members so each country can decide what air services must get advance permits to carry revenue traffic into or over national borders. Under an ICAO-ratified rule, nonscheduled services don't have to get special permits; while the scheduled lines do.

The U. S. domestic definition is designed by CAB to hold non-certificated air operators to the limited amount of common carriage services permitted them in Part 291 of the CAB-drawn Economic Regulations. These regulations are designed to protect certificated carriers from too much competition.

KLM Converting Connies for Capital

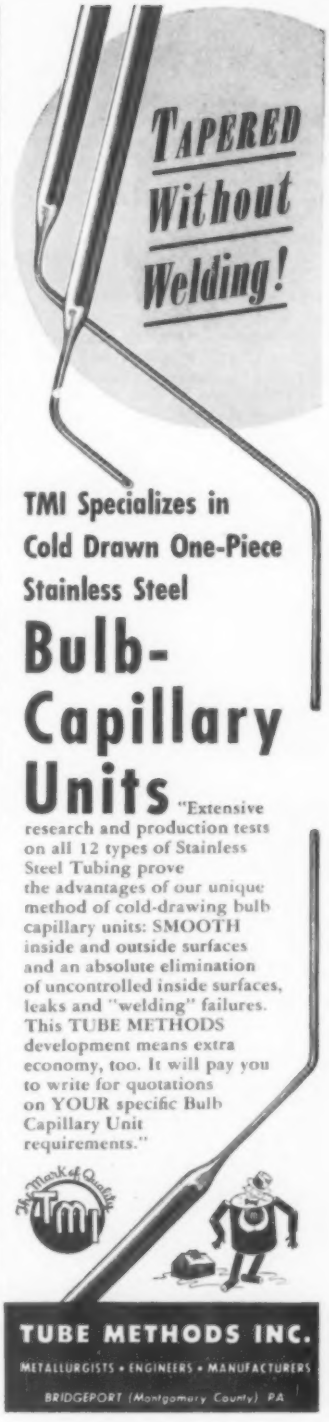
(McGraw-Hill World News)

Amsterdam—KLM Royal Dutch Airlines is well along on its project of converting seven of its KLM 749A Constellations to prepare them for use by Capital Airlines.

First Connie was scheduled to be delivered this month, the second in May. The remaining five will probably be reconverted when KLM's replacement Super Connies are delivered.

The Dutch airline received the contract apparently because of lack of available facilities in the U. S. to do the job quickly and lower labor costs in Holland. KLM's Schiphol facility is CAA-approved.

Included in the modifications are transfer of the pantry to the rear of the fuselage and conversion of the galley into a lounge.


TAPERED
Without
Welding!
TMI Specializes in
Cold Drawn One-Piece
Stainless Steel
Bulb-
Capillary
Units
"Extensive research and production tests on all 12 types of Stainless Steel Tubing prove the advantages of our unique method of cold-drawing bulb capillary units: SMOOTH inside and outside surfaces and an absolute elimination of uncontrolled inside surfaces, leaks and "welding" failures. This TUBE METHODS development means extra economy, too. It will pay you to write for quotations on YOUR specific Bulb Capillary Unit requirements."
The Mark of Quality
TMI
TUBE METHODS INC.
METALLURGISTS • ENGINEERS • MANUFACTURERS
BRIDGEPORT (Montgomery County) PA.

Nonskeds in New Bid For Military Traffic

Nonscheduled and cargo airlines have started bidding for military contracts through a single representative—the Joint Traffic Control Board. The new board was formed by two nonsked units at the insistence of the Office of Military Traffic Service, Defense Department. The two associations: Air Coach Transport Assn. and Independent Military Air Transport Assn.

The MTS also has brought about a final decision by each unit member as to which group it will deal through for purposes of getting official and unofficial military business. Previously, some carriers belonged to both associations.

Here are the results of each nonsked and cargo airline selection of one unit as its military business representative. Of 52 carriers, 12 picked IMATA and 40 picked ACTA.

• **Independent Military Air Transport Assn.:** Air American, Inc., All American Airways, Inc., American Air Export & Import Co., American Flyers Airline Corp., Associated Air Transport, Inc., Capital Airways, Inc., Continental Charters, Inc., Flying Tiger Line, Inc., Overseas National Airways, S. S. W., Trans Caribbean Airways, and Transocean Air Lines.

• **Currently inactive** IMATA members are: Economy Airways, Inc., and U. S. Airlines, Inc.

• **Air Coach Transport Assn.:** Aero Finance Corp., Air Cargo Express, Air Services, Inc., Air Transport Associates, Inc., American Air Transport, Inc., Arctic-Pacific, Inc., Arnold Air Service, Inc., Argonaut Airways Corp., Aviation Corp. of Seattle, Blatz Airlines, Inc., California Central Airlines, Caribbean American Airlines, Central Air Transport, Inc., Coastal Cargo Co., Inc., Conner Airlines, Inc., Curry Air Transport, Federated Airlines, Inc., General Airways, Inc., Great Lakes Airlines, Inc., Hemisphere Air Transport, Kesterson, Inc. DBA California Air Charter, Los Angeles Air Service, Inc., Meteor Air Transport, Miami Airlines, Inc., Modern Air Transport, Inc., Monarch Air Service, New England Air Express, Peninsular Air Transport, Robin Airlines, Inc. DBA North Continental Airlines, Southern Air Transport, Standard Air Cargo, Toten Air Service, Inc., Trans-American Airways, Trans-National Airlines, Inc., Twentieth Century Airlines, Unit Export Company, Inc., United States Overseas Airlines, Inc., U. S. Aircoach, Viking Airlines, Inc., and World Airways.

Both associations report securing increased business in the two weeks since starting joint bidding.

But competition among the nonskeds for military business is increasing now because their civilian common carriage business is falling off. Scheduled airline competition with the recent transcontinental coach fare decrease is one reason blamed for the nonsked plight.

CAB Lists Charges Against Airline

Civil Aeronautics Board has disclosed a bill of particulars on alleged law violations by Lake Central Airlines and its management. If the charges are proved, the Board investigation will end by a decision on what actions to take against the management and/or the company itself.

The proceeding includes the question of whether the company deserves renewal of its temporary certificate.

Here are the main charges made public by CAB at the pre-hearing conference in this case—The "Reopened Indiana-Ohio Local Service Case":

• **Unlawful interlocking directorates** and common control of Lake Central, Nationwide Air Transport Services, Nationwide Airlines, Nationwide Maintenance, Frontier Airmotive, Central Purchasing Agency, Inc., and R. Paul Weesner DBA Frontier Airmotive.

• **Falsified accounts.**

• **Erroneous or false reports** to CAB on Form 41.

• **Non-reporting of salary** of $4,400 to the executive vice president in 1951.

• **Charging off** cost of operation of Nationwide Airlines' intrastate route to Lake Central, while crediting it with none of the revenue.

• **Non-reporting of borrowings** in 1950 and 1951, including a $160,000 chattel mortgage plus other notes of unknown amount.

• **Free services** to Nationwide Airlines, without entry on LCA books.

• **Non-entry on LCA books** of $22,000 C-46 charter from Frontier Airmotive of Del., and non-filing of such commission to CAB.

• **Borrowing at high interest** from Executive Vice President R. Paul Weesner.

• **Unreasonable payments** to Central Purchasing Agency, improperly entered on books.

• **Excessive salary** payment "to its president, for which no, or practically no, services were rendered to Lake Central."

The Bureau of Air Operations counsel presented these charges at the pre-hearing conference. Lake Central's counsel wanted more detail on the charges, but bureau counsel declined, with certain exceptions, on grounds that this would disclose evidence. The CAB examiner upheld the bureau counsel.

ICAO Begins Survey Of Colombia Aviation

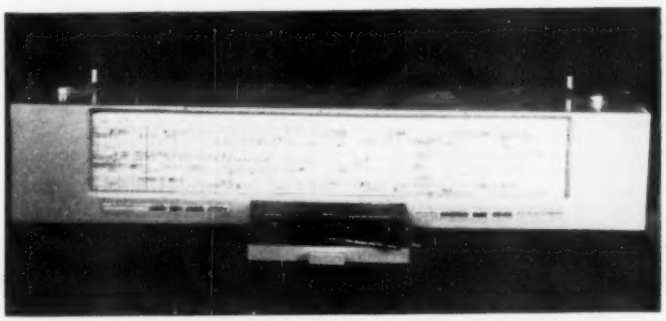
(McGraw-Hill World News)

Bogota—Two International Civil Aviation Organization experts have arrived here to begin a survey of the necessity for a training center in the Caribbean area to aid neighboring countries in setting up modern air transport facilities and operations methods.

ICAO would sponsor such a training center under its program of technical assistance for economic development and would supervise the training of local personnel.

Merger Urged

Civil Aeronautics Board Examiner W. J. Madden recommends that the Board approve the Braniff Mid-Continent merger application. Only in



HANDY TRANSPORT MAINTENANCE REFERENCE

Up-to-date visual record of flight and maintenance status of all Naval Air Transport Squadron Three's aircraft is kept on this roller chart which uses keyed colors to represent availability, type of utilization or maintenance condition. A complete week's record is visible at a time, and the paper roll carries a six-month account. Turning the cranks atop the 36x7x7-in. box moves the chart to provide new record space or to check on recent activities. Squadron Three is a MATS unit.

portant condition he attaches to the recommendation is that CAB make sure Braniff protects its employes along lines proposed by Braniff. No route alterations are to be considered in the merger case.

Fare Increases Seen for Australia

(McGraw-Hill World News)

Melbourne—Australian National Airways, which has long resisted any increase in fares, is expected to go along with expected raises to offset a 20% jump in price of 100-octane fuel in Australia. There is no increase seen at present in cost of 91-octane fuel.

The government has decided to give ANA some mail business and support an adjustment of flying schedules. ANA has been hoping that its government-owned competitor, TAA would be liquidated or at least merged with ANA, but there will be no such action for some time.

A decision is being made on providing ANA with badly needed replacement aircraft.

Huge Expansion of Air Travel Forecast

U.S. domestic airlines can look forward to carrying 43 million passengers annually by 1953, unless the national economy suffers a setback presently unseen, CAA Deputy Administrator F. B. Lee told a gathering of the American Assn. of Airport Executives in Ft. Worth recently.

This prediction would mean almost doubling last year's record 23 million passengers flown. Several firm guides, said Lee, point the way.

- National income could reach $400 billion by 1960.
- Population then will be approximately 169 million, Bureau of Census estimates.
- Invasion by helicopter services is now in prospect in the highly lucrative and as yet untouched (by aircraft) short-haul intercity traffic market covering trips up to 75 miles.

Touching on this short-haul market, Lee said, "What this kind of air travel will do to the figures on passengers carried in the next ten years should make any forecaster nervous." As things now stand, the Air Coordinating Committee has predicted short-haul passenger copter service availability will move up to 1955 rather than the previous estimate of 1960.

Put Your Scrap Back to Work

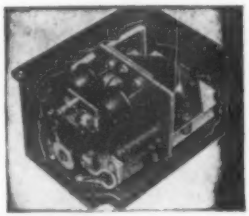
. . . all are equipped with the new Hartman 400-ampere high interrupting capacity cutouts

Modern wide speed range generators of large aircraft—designed to meet heavy load demands of electronic devices and other equipment formerly actuated by non-electrical means—pose unusually difficult control problems.

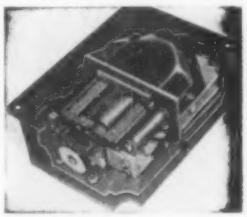
For example, 28-volt generators can produce up to 175 volts if a short circuit applies full field at high rpm as on takeoff. In addition to being able to interrupt these high voltages from sea level to 50,000 feet, control relays must also give trouble-free operation through thousands of cycles at rated capacity . . . must withstand wide temperature ranges, dust, humidity, vibration, acceleration and shock.

These new Hartman Reverse Current Cutouts have an interrupting capacity greatly in excess of all requirements under all conditions. That's why today manufacturers and operators are turning to these new cutouts for use on new and existing aircraft.

So if your problem involves d-c controls, turn it over to Hartman where it will be analyzed, engineered and produced with an efficiency that comes from nearly half a century of specialization. A-0004



New Hartman 400-Ampere 28 Volt Reverse Current Cutout (A-750D)



New Hartman 400-Ampere 28 Volt Contactor for aircraft with panelized systems (A-751D)

the Hartman Electrical Mfg. co.

"D-C CONTROL HEADQUARTERS" MANSFIELD, OHIO

Nonskeds in New Bid For Military Traffic

Nonscheduled and cargo airlines have started bidding for military contracts through a single representative—the Joint Traffic Control Board. The new board was formed by two nonsked units at the insistence of the Office of Military Traffic Service, Defense Department. The two associations: Air Coach Transport Assn. and Independent Military Air Transport Assn.

The MTS also has brought about a final decision by each unit member as to which group it will deal through for purposes of getting official and unofficial military business. Previously, some carriers belonged to both associations.

Here are the results of each nonsked and cargo airline selection of one unit as its military business representative. Of 52 carriers, 12 picked IMATA and 40 picked ACTA.

• **Independent Military Air Transport Assn.:** Air American, Inc., All American Airways, Inc., American Air Export & Import Co., American Flyers Airline Corp., Associated Air Transport, Inc., Capital Airways, Inc., Continental Charters, Inc., Flying Tiger Line, Inc., Overseas National Airways, S. S. W., Trans Caribbean Airways, and Transocean Air Lines.

• **Currently inactive** IMATA members are: Economy Airways, Inc., and U. S. Airlines, Inc.

• **Air Coach Transport Assn.:** Aero Finance Corp., Air Cargo Express, Air Services, Inc., Air Transport Associates, Inc., American Air Transport, Inc., Arctic-Pacific, Inc., Arnold Air Service, Inc., Argonaut Airways Corp., Aviation Corp. of Seattle, Blatz Airlines, Inc., California Central Airlines, Caribbean American Airlines, Central Air Transport, Inc., Coastal Cargo Co., Inc., Conner Airlines, Inc., Curry Air Transport, Federated Airlines, Inc., General Airways, Inc., Great Lakes Airlines, Inc., Hemisphere Air Transport, Kesterson, Inc. DBA California Air Charter, Los Angeles Air Service, Inc., Meteor Air Transport, Miami Airlines, Inc., Modern Air Transport, Inc., Monarch Air Service, New England Air Express, Peninsular Air Transport, Robin Airlines, Inc. DBA North Continental Airlines, Southern Air Transport, Standard Air Cargo, Toten Air Service, Inc., Trans-American Airways, Trans-National Airlines, Inc., Twentieth Century Airlines, Unit Export Company, Inc., United States Overseas Airlines, Inc., U. S. Aircoach, Viking Airlines, Inc., and World Airways.

Both associations report securing increased business in the two weeks since starting joint bidding.

But competition among the nonskeds for military business is increasing now because their civilian common carriage business is falling off. Scheduled airline competition with the recent transcontinental coach fare decrease is one reason blamed for the nonsked plight.

CAB Lists Charges Against Airline

Civil Aeronautics Board has disclosed a bill of particulars on alleged law violations by Lake Central Airlines and its management. If the charges are proved, the Board investigation will end by a decision on what actions to take against the management and or the company itself.

The proceeding includes the question of whether the company deserves renewal of its temporary certificate.

Here are the main charges made public by CAB at the pre-hearing conference in this case—The "Reopened Indiana-Ohio Local Service Case":

• **Unlawful interlocking directorates** and common control of Lake Central, Nationwide Air Transport Services, Nationwide Airlines, Nationwide Maintenance, Frontier Airmotive, Central Purchasing Agency, Inc., and R. Paul Weesner DBA Frontier Airmotive.

• **Falsified accounts.**

• **Erroneous or false reports** to CAB on Form 41.

• **Non-reporting of salary** of $4,400 to the executive vice president in 1951.

• **Charging off** cost of operation of Nationwide Airlines' intrastate route to Lake Central, while crediting it with none of the revenue.

• **Non-reporting of borrowings** in 1950 and 1951, including a $160,000 chattel mortgage plus other notes of unknown amount.

• **Free services** to Nationwide Airlines, without entry on LCA books.

• **Non-entry on LCA books** of $22,000 C-46 charter from Frontier Airmotive of Del., and non-filing of such commission to CAB.

• **Borrowing at high interest** from Executive Vice President R. Paul Weesner.

• **Unreasonable payments** to Central Purchasing Agency, improperly entered on books.

• **Excessive salary** payment "to its president, for which no, or practically no, services were rendered to Lake Central."

The Bureau of Air Operations counsel presented these charges at the pre-hearing conference. Lake Central's counsel wanted more detail on the charges, but bureau counsel declined, with certain exceptions, on grounds that this would disclose evidence. The CAB examiner upheld the bureau counsel.

ICAO Begins Survey Of Colombia Aviation

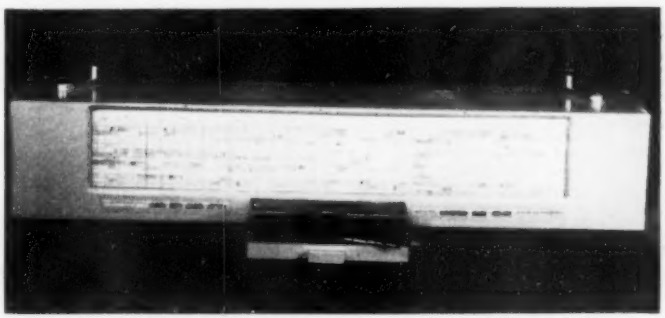
(*McGraw-Hill World News*)

Bogota—Two International Civil Aviation Organization experts have arrived here to begin a survey of the necessity for a training center in the Caribbean area to aid neighboring countries in setting up modern air transport facilities and operations methods.

ICAO would sponsor such a training center under its program of technical assistance for economic development and would supervise the training of local personnel.

Merger Urged

Civil Aeronautics Board Examiner W. J. Madden recommends that the Board approve the Braniff-Mid-Continent merger application. Only in



HANDY TRANSPORT MAINTENANCE REFERENCE

Up-to-date visual record of flight and maintenance status of all Naval Air Transport Squadron Three's aircraft is kept on this roller chart which uses keyed colors to represent availability, type of utilization or maintenance condition. A complete week's record is visible at a time, and the paper roll carries a six-month account. Turning the cranks atop the 36x7x7-in. box moves the chart to provide new record space or to check on recent activities. Squadron Three is a MATS unit.

portant condition he attaches to the recommendation is that CAB make sure Braniff protects its employes along lines proposed by Braniff. No route alterations are to be considered in the merger case.

Fare Increases Seen for Australia

(McGraw-Hill World News)

Melbourne—Australian National Airways, which has long resisted any increase in fares, is expected to go along with expected raises to offset a 20% jump in price of 100-octane fuel in Australia. There is no increase seen at present in cost of 91-octane fuel.

The government has decided to give ANA some mail business and support an adjustment of flying schedules. ANA has been hoping that its government-owned competitor, TAA would be liquidated or at least merged with ANA, but there will be no such action for some time.

A decision is being made on providing ANA with badly needed replacement aircraft.

Huge Expansion of Air Travel Forecast

U. S. domestic airlines can look forward to carrying 43 million passengers annually by 1953, unless the national economy suffers a setback presently unseen, CAA Deputy Administrator F. B. Lee told a gathering of the American Assn. of Airport Executives in Ft. Worth recently.

This prediction would mean almost doubling last year's record 23 million passengers flown. Several firm guides, said Lee, point the way.

- National income could reach $400 billion by 1960.
- Population then will be approximately 169 million, Bureau of Census estimates.
- Invasion by helicopter services is now in prospect in the highly lucrative and as yet untouched (by aircraft) short-haul intercity traffic market covering trips up to 75 miles.

Touching on this short-haul market, Lee said, "What this kind of air travel will do to the figures on passengers carried in the next ten years should make any forecaster nervous." As things now stand, the Air Coordinating Committee has predicted short-haul passenger copter service availability will move up to 1955 rather than the previous estimate of 1960.

Put Your Scrap Back to Work

. . . all are equipped with the new Hartman 400-ampere high interrupting capacity cutouts

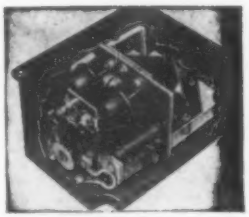
Modern wide speed range generators of large aircraft—designed to meet heavy load demands of electronic devices and other equipment formerly actuated by non-electrical means—pose unusually difficult control problems.

For example, 28-volt generators can produce up to 175 volts if a short circuit applies full field at high rpm as on takeoff. In addition to being able to interrupt these high voltages from sea level to 50,000 feet, control relays must also give trouble-free operation through thousands of cycles at rated capacity . . . must withstand wide temperature ranges, dust, humidity, vibration, acceleration and shock.

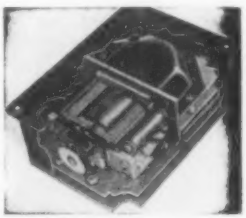
These new Hartman Reverse Current Cutouts have an interrupting capacity greatly in excess of all requirements under all conditions. That's why today manufacturers and operators are turning to these new cutouts for use on new and existing aircraft.

So if your problem involves d-c controls, turn it over to Hartman where it will be analyzed, engineered and produced with an efficiency that comes from nearly half a century of specialization.

A-3004



New Hartman 400-Ampere 28 Volt Reverse Current Cutout (A-750D)



New Hartman 400-Ampere 28 Volt Contactor for aircraft with panelized systems (A-751D)

the Hartman Electrical Mfg. co.

"D-C CONTROL HEADQUARTERS" MANSFIELD, OHIO

WITH HANSEN COUPLINGS

MINUTES SAVED ARE HOURS GAINED

CONNECTION takes only a second

With Hansen couplings you save precious minutes every time you connect or disconnect a fluid line carrying gas, liquid or grease.

To connect, you merely push plug into socket—flow starts instantly. To disconnect, pull back sleeve on socket—coupling disconnects. Flow is shut off instantly and automatically.

From a wide range of available sizes and types, you can select a Hansen coupling exactly suitable for your application—each type engineered to meet its special requirements.

Locking pins in Hansen Push-Tite Coupling Socket afford large area contact with plug, thereby preventing wear and subsequent leakage.

One-way shut-off, two-way shut-off, and straight-through types. Write for catalog giving complete listing of sizes and types.

REPRESENTATIVES

Baltimore	Denver	Louisville	Rochester
Birmingham	Detroit	Milwaukee	San Francisco
Chicago	Ft. Wayne	Minneapolis	Savannah
Cleveland	Hartford	New Orleans	Seattle
Dallas	Los Angeles	Pittsburgh	St. Louis
Dayton	Montreal • Toronto • Vancouver		

Export Department: Cleveland

THE HANSEN MANUFACTURING COMPANY

4031 WEST 150th STREET • CLEVELAND 11, OHIO

TWA
Lowest year-round transatlantic fares* ever!
TWA
Sky Tourist
Constellation Service
to LONDON only $270
PARIS • $290
ROME • $357.20
FRANKFURT • $313.10
(Fares shown are from New York—plus tax)
Enjoy the luxury of world-proved, world-famous TWA Constellations...overnight from the U.S.A.
See your travel agent or call Trans World Airlines.
*Effective May 1
Across the U.S. and overseas... you can depend on TWA

SHORTLINES

► **Air Line Pilots Assn.** says the Port of N. Y. Authority awaits CAA approval to install the ALPA centerline approach light system at Newark Airport. . . . ALPA credits American Capt. Jack Durham with originating the prop reversal safety modification now being engineered (AVIATION WEEK Apr. 14, p. 84).

► **BACA Airlines** has asked CAB certification to bring helicopter service for metropolitan and downtown St. Louis, for fixed-wing 8-passenger flights from Kansas City to St. Louis. . . . The non-subsidized local line plans to replace its 5-passenger Reliants with 8-passenger de Havilland Beavers and, ultimately, 14-passenger de Havilland Otters.

► **British European Airways** reports traffic gained 30% in Jan. over a year ago.

► **Burma Airways** has ordered three Handley Page Marathon 18-passenger transports.

► **Capital Airlines** is selling its three Super DC-3s to U. S. Steel. Capital will maintain and operate them for the company on contract. . . . Capital starts a New Orleans-Birmingham-New York Constellation service with flight Apr. 27.

► **El Al Airlines** is reported negotiating a 50-50 partnership with foreign investors, as the company is severely handicapped by lack of capital. El Al has not denied the report. It recently borrowed $375,000 from Chase National Bank to buy spare parts for its transport fleet.

► **Hawaiian Airlines** plans to borrow $3.5 million to buy six 44-passenger Convair 340s; first is slated for fall delivery. Convair operation will require lengthening the runways on two island airports.

► **North American Air Coach System** Secretary-Treasurer Stanley Weiss says revenues the first quarter this year were up 40% over a year ago, despite a slump in New York-Miami business in February. . . . Company cut N. Y.-Miami fare from $43 to $39 when National and Eastern came down to $43 Apr. 1. . . . The agency claims to handle about 30% of the domestic nonscheduled commercial airline business.

► **Pioneer Air Lines** plans to start 36-passenger Martin 2-0-2 service June 1.

First five of the nine bought from NWA are in modification at Temco Aircraft Corp. They will be called "Pacemasters."

▶ **Qantas Empire Airways** starts Constellation service Australia-South Africa in July—claims the new route will cut the time from seven days to three.

▶ **Sabena,** Belgian airline, has signed an interline agreement with Slick Airways and Flying Tiger Line providing U. S.-Europe transshipment of air cargo.

▶ **TPA Aloha Airline** traffic gained 6% in March over a year ago.

▶ **Trans-Canada Air Lines** will buy no jets at present, will add eight new piston-engine planes to its present fleet of 47. . . . Has ordered five Constellations for delivery in 1953 at a cost of $9 million for use on Atlantic routes. . . . Has purchased three DC-4 North Stars from Canadian Pacific Airlines for domestic service. . . . Reports 1951 passenger traffic on Atlantic operations up 20% over 1950, cargo and express up 13% and air mail up 11%.

▶ **Trans World Airlines** domestic traffic gained 22% to 360,712,002 revenue passenger miles and international 12% to 73,807,000 the first quarter compared with a year ago.

▶ **United Air Lines** President W. A. Patterson forecasts a 15 to 25% revenue gain for UAL this year. . . . He says it will be at least seven years before anything but a prototype jet airliner is operating in the U. S., and that no single airline can finance jet plane construction as cost is two to four times present planes. . . . Company has added a daily Chicago-San Francisco DC-4 aircoach to schedules.

Where to Buy
PRODUCTS - SERVICES ACCESSORIES

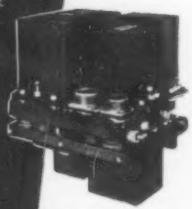
DRAFTSMEN ATTENTION
Eliminate rubber stamps, tedious hand lettering and ruling with
"TRANSEALS"®
Applied easily to your drawings, as Title Blocks, Symbols, Notes, etc.
Write for samples and prices
JOHNSON RESEARCH CORP.
Broadway, Bethpage, N. Y.

mechatronics*

We call it **mechatronics** as a symbol for Servomechanisms', Inc., ***technique*** for the multiple and interchangeable use of standard, functionally packaged, servo components in varied electronic and electro-mechanical systems.

Mechatronics fulfills the urgent need for:

- Spatial Adaptability
- Instant Maintainability
- Training Simplicity
- Ease of Assembly



A typical Servomechanisms, Inc., assembly using packaged functions.

SERVOmechaNISMS INC.

El Segundo, Calif. • POST AND STEWART AVES., WESTBURY, N. Y. • Ft. Lauderdale, Florida

CLASSIFIED **SEARCHLIGHT SECTION** ADVERTISING

EMPLOYMENT • BUSINESS • **OPPORTUNITIES** • EQUIPMENT—USED or RESALE

ENGINEERS

FOR DEVELOPING TURBOJET AND RAM JET CONTROL SYSTEMS

Responsible positions with an excellent future open to aeronautical and mechanical engineers interested in developing control systems for supersonic aircraft engines. Experience in servo mechanisms, automatic controlling systems, and allied instrumentation desired.

Starting salaries up to $7,000 with opportunities for advancement. Extra pay for Saturday work. Many employee benefits.

Employment Office open Mon. thru Sat. 8:15 A.M. to 5 P.M.

Call Mr. J. Johnson, Telephone Number PRescott 7-2900, Extension 2060 or Send Complete Resume.

WRIGHT AERONAUTICAL DIVISION
Curtiss-Wright Corporation
MAIN AND PASSAIC STREETS, WOOD-RIDGE, NEW JERSEY

AC SPARK PLUG DIVISION
of
GENERAL MOTORS CORPORATION

PRECISION INSTRUMENT PLANT

Positions now available for highest caliber personnel in the field of airborne automatic, electro-mechanical control equipment.

MECHANICAL DESIGN ENGINEERS
ELECTRONIC ENGINEERS
SERVO ENGINEERS
ELECTRONIC DESIGNERS
MECHANICAL DESIGNERS

New and expanding division of an established firm with 20 years of successful experience in the instrument field. Work involved deals with the manufacture and development of highly complex equipment of the most advanced type.

Write or Apply

AC Spark Plug Division
GENERAL MOTORS CORPORATION
1925 E. Kenilworth Place
Milwaukee 2, Wisconsin

OBTAIN YOUR
AIRCRAFT DISPATCHER
LICENSE IN FOUR MONTHS

CAA approved course starts May 5th. Graduates now with world's leading airlines

OTHER COURSES:

Airline Stewardess
Flight Navigator Refresher
Aviation Cadet Preparatory
Pilot Ground School
Link Training

Eastern Air Navigation Service
air agency cert. 3086
5 West 46 Street—New York City
"serving the airlines of the world"

DEVELOPMENT ENGINEER
FOR AIRCRAFT FUEL PUMP AND FUEL COMPONENT DEVELOPMENT
Apply or write, Personnel Department
CHANDLER-EVANS DIVISION
NILES-BEMENT-POND COMPANY
WEST HARTFORD CONNECTICUT

CONTROL ENGINEER
To Work on Analysis and Development of Jet Engine Hydraulic Power Control Systems and Components
Apply or write, Personnel Department
CHANDLER-EVANS DIVISION
NILES-BEMENT-POND COMPANY
WEST HARTFORD CONNECTICUT

FUTURE HELICOPTER PASSENGER PROGRAM HAS OPENINGS FOR
Helicopter Pilots, Mechanics, General Operations, Maintenance and Traffic Personnel.
Address reply direct to:
LOS ANGELES AIRWAYS, INC.
Box 10188 Airport Station, Los Angeles 45, Calif.

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

AIRPLANE MECHANIC. Competent, experienced, licensed Airplane Mechanic, for maintenance, repair Douglas C-47A airplane, Pratt and Whitney engines. Jacaton Bolivia, South America, standard three year contract, single preferably, or if married single status for six months, free transportation furnished to Bolivia by air, four weeks vacation yearly, salary $4800 yearly plus yearly bonus one Month's salary, knowledge of Spanish desirable. P-3914, Aviation Week.

SUPERVISORS—HANGAR and Flight Line. Immediate and prospective openings for individuals fully qualified in Jet Aircraft operation for our F-84-F Program. Send full details of experience and personal data to the Employment Manager, B-O-P Assembly Division, General Motors Corporation, Fairfax District, Kansas City, Kansas.

Don't forget
THE BOX NUMBER . . .
when answering the classified advertisements in this magazine. It's our only means of identifying the advertisement you are answering.

POSITIONS WANTED

AIRLINE CAPTAIN—total 10,500 accident free flight hours, 16 years Aeronautical & Flying experience in domestic & International flight operations, presently employed as airline instructor pilot by selected Latin American Air Carrier. Desires permanent employment as Executive, Company or Corporation Pilot, with additional duties if desired. Age 36, excellent health & personal appearance. Hold Airline Transport Rating 6-6600 horsepower Land. Flight Instructor. Have excellent business background and experience. University Graduate. Excellent reference. PW-3793, Aviation Week.

7,000 Hours, ATR, Multi Engine Land. 3 years Aeronautical Engineering, 5 years Pilot and Chief Pilot Air Transport Command, 4 years and Airline Transport Rating from United Air Lines. Age 32, married. Want to work for a good company, not the pilot's union. Can provide A-1 references from UAL. PW-3969, Aviation Week.

FOR SALE

Beechcraft Airplane.
converted AT-11, manufactured Nov. 1944, modified for CAA certification by Spartan at Tulsa in 1946. Total hours since overhaul, right engine 160 since overhaul. Constant speed propellers, ADF, 522 VHF, and Command radio. Licensed as of September 1950. All bulletins complied including hydraulic main gear drag links. Interior unfinished, 50 gallon cabin fuel tank. Apertures for vertical cameras. Plane painted white with red trim, excellent mechanical shape. Price $17,600. Wayne Thomas, aviation editor, Chicago Tribune, Chicago. Superior 7-0100.

New Lodestar Material.
wings, ailerons, flaps, stabilizers, dishpans, engine mounts, bays, tail pipes and complete landing gear assembly with tire and tube. Stinson Field Aircraft, 6015 Mission Road, San Antonio, Texas. Wa-0421.

HELICOPTER SPECIALISTS

TWO MEN WANTED
FOR
LONG-TERM PROJECT

AERODYNAMICIST

Prefer man with B.S. in aeronautical engineering and 4 years experience in aerodynamics, 2 of them in the helicopter field.

DYNAMICIST

Prefer man with B.S. in aeronautical or mechanical engineering and 4 years experience in dynamics, 2 of them in the helicopter field.

Interesting work and ideal conditions with leading firm.

WRITE
HUGHES
AIRCRAFT COMPANY
CULVER CITY
CALIFORNIA

RECENT ENGINEERING GRADS

Are You Interested In Getting An Advanced Degree?

If you want to combine work and study, and at the same time gain experience in research techniques, full time employment opportunities are available in aerodynamic research projects utilizing wind tunnel facilities. Any type of engineering training acceptable. Submit details of background to Mr. F. K. Womack:

University of Minnesota
Aeronautical Engineering Lab
Rosemont Research Center, Rosemont, Minnesota

DEVELOPMENT ENGINEER

AVIATION ENGINE AND FLIGHT TYPE INSTRUMENTS

Staff position open to well qualified engineer for development of electro-mechanically operated aircraft instruments. Engineering degree plus experience in this field a prerequisite.

Fine opportunity to grow with a young, progressive organization, directed by an alert engineering management and ownership.

Send complete resume to: Personnel Manager

Avien

34-56 58th St. Woodside, N. Y.

ENGINEERS

GOODYEAR AIRCRAFT

CHALLENGE AND CAREERS
FOR
ENGINEERS and SCIENTISTS

GOODYEAR AIRCRAFT CORPORATION
RUNS THE GAMUT OF PROJECTS

Navy blimp and the most advanced jet fighter, commercial amphibians and helicopters, guided missiles and radar screens, electronic computers, tow targets, convertiplanes, gun mounts, fuel tanks, wheels and brakes, and stratosphere balloons are on the board or in the production shops of

Goodyear Aircraft Corporation

Careers are being built on the solid foundation of
Goodyear Aircraft Corporation
a subsidiary of
The Goodyear Tire and Rubber Company

ENGINEERS

AERONAUTICAL
MECHANICAL
ELECTRICAL
AERO DYNAMICISTS
ELECTRONICS
CIVIL
INDUSTRIAL
PHYSICISTS

NEEDED TO WORK ON

RESEARCH DESIGN DEVELOPMENT

NEEDED ALSO ARE

TOOL PROCESSORS TOOL DESIGNERS TOOL PLANNERS
PLANT ENGINEERS
METALLURGISTS
HEATING & VENTILATING ENGINEERS

G.A.C. offers a planned educational advancement program applicable to experienced undergraduates as well as to graduate engineers who are experienced or inexperienced in the aeronautical field.

Salary positions with bonus for extended work week. Free insurance, liberal vacation plan and other benefits are available.

Prompt and serious consideration will be given your inquiries addressed to:
Mr. C. G. Jones, Salary Personnel Department

GOODYEAR AIRCRAFT CORPORATION
AKRON 15, OHIO

Chance Vought Aircraft, builder and designer of the "Cutlass" and "Corsair", has openings for top level technical personnel in electronics and aerophysics for supervisory positions in long range development and design programs on piloted and pilotless aircraft.

Reliability supervisor to supervise the establishment and maintenance of optimum reliability of electronic and control systems. Requires degree in electrical engineering, advanced studies in mathematics plus 7 to 8 years related experience.

Guidance supervisor—to direct a group in the analysis, design and development of electronic guidance systems for pilotless aircraft. Requires special knowledge of guidance, design and control problems. Requires M.S. in electrical engineering with 7 to 8 years related experience.

Aerophysics project engineers—to direct groups in the analysis and solution of problems establishing requirements and specifications for electronic and control systems in relation to aircraft performance. Requires intensive knowledge of physics, mathematics, aeronautical engineering and highly specialized knowledge in the field of automatic controls. Equivalent to PH.D and 5 to 8 years related experience.

Excellent salaries and working conditions. Housing readily available in Dallas area. Liberal moving allowance. Submit resume of education and technical experience to engineering personnel office.

CHANCE VOUGHT AIRCRAFT
DIVISION OF UNITED AIRCRAFT CORPORATION
P. O. BOX 5907 • DALLAS, TEXAS

The California Institute of Technology

Jet Propulsion Laboratory
Pasadena, California

. . . has several openings in the following engineering fields:

- Preliminary Design
- Engineering Analysis
  - Aerodynamics
  - Aerodynamic Heating
  - Heat Transfer
  - Thermodynamics
  - Dynamics
  - Structural Studies
  - Statistical Studies
- Structural Design
- Propulsion System Development
- Test Engineers—Wind Tunnel
  - Experienced in supersonic wind-tunnel tests desirable.

Excellent opportunity exists to learn all phases related to missiles, rockets and wind tunnel test operations. Apply giving details pertaining to academic background and work experience to

JET PROPULSION LABORATORY
4800 OAK GROVE DRIVE
PASADENA 2, CALIFORNIA

WANTED

PROCESS-STANDARD UNIT CHIEF

Opening for experieced man to supervise the operations of a unit involved in production and research in the Boeing B-47 jet bomber program for the U. S. Air Force. This includes work in the fields of standards, chemistry, metallurgy and mechanical processing; plastics, adhesives and sealers. Must be engineering graduate, preferably in chemistry, metallurgy or aeronautics, with a minimum of ten years experience, at least five of which must be in the aircraft industry. Must have had supervisory experience. Write for application blank or submit personal history including education, work experience and references to Paul Pearce, Personnel Engineer, Boeing Airplane Company, Wichita 1, Kansas.

Needed Now!

Structures Engineers

Openings in all classifications—wide variety of progressive projects.

Aerodynamics Engineers

Two to six years' experience. Aerodynamic testing, design and development.

•

Martin has the greatest diversity of projects of any aircraft company in the East. Offers greater opportunities for development, career positions for qualified engineers. Submit strictly confidential resume outlining qualifications in detail. Personal interviews arranged.

THE GLENN L. MARTIN CO.
Personnel Dept. • Baltimore 3, Md.

ENGINEERS

Our military airframe design program offers excellent opportunity to engineers with airframe experience. We have openings in structures, layout and detail. Small expanding company. Overtime work schedule.

ANDERSON, GREENWOOD & CO.
Municipal Airport Houston 17, Texas

PRODUCTION MANAGER WANTED

Industrial & Electrical Products—Company has top reputation and 400 employees—Present Manager moving up—Cooperative associates — Interesting future — Excellent compensation arrangements—Please give full data including requirements and enclose recent photo.

Several positions also available for graduate engineers.

M. G. CHAMBERLAIN & COMPANY
Industrial Consultants
8345 W. Olympic Blvd. Beverly Hills, Calif.

CANADIAN AGENCIES WANTED

Canadian company, with excellent references and record, and widely known in the aviation field in Canada, would accept agencies for exclusive distribution of appropriate aircraft products and accessories.

THE BABB COMPANY (Canada) Limited
Trans-Atlantic Building
Montreal Airport
Dorval, Quebec

WORTH WAITING FOR:

LOCKHEED PV-1

Speed 260 mph (T.A.S.) - Range 1500 Mi.

We have several PV-1 Venturas that are ready for immediate fly-away. They are now unconverted. One aircraft has only 440 hrs. since new—other has 1100 hrs. These are in unusually fine condition. Will stand rigid inspection. *AVAILABLE IMMEDIATELY.*

Call or Wire

LEEWARD AERONAUTICAL
Fort Wayne, Ind. Ph. H-2145 — or — Miami, Fla. Ph. 9128

LOCKHEED LODESTAR N 60000

Late serial (2537)—just converted to plush executive Lodestar—Indirect lighting in cabin—special plush lavatory—six chairs — divan — desk — hot cup — folding tables—dual fuel system—complete VHF and Omni—recent airframe overhaul—new zero time engines—truly beautiful inside & out.

PAGE AIRWAYS, INC.
Rochester Airport Rochester, N. Y.

HANGARS FOR SALE

All Steel packaged for shipment complete.
2 sizes: 194' x 200'—148' x 162'
Immediate Delivery—We erect anywhere

ANDERSON AIRCRAFT CORPORATION
1700 Sawtelle Blvd., Bradshaw 2-1242 Los Angeles 25, California Arizona 3-2681

AIRCRAFT PRODUCTION MACHINERY
IMMEDIATE DELIVERY
AIR TOOLS • ROUTERS
MAGNAFLUXES
MONTGOMERY ENGINEERING CO.
14195 Prairie Ave. Detroit 4, Michigan Telephone TExas 4-2040

WANTED
CURTISS PROPELLER BEARINGS
104875 Bearing Assembly (5 in Stock) New Departure 5 P26-4-OP26 or MRC 4 7026-7CC—1 7026-9CC
Advise Quantity, Condition and Price.
Also Interested in C5438 and C5428 Propellers, Blades and Parts
W-3671, Aviation Week
330 W. 42nd St., New York 36, N. Y.

ENGINEERS

Special opportunities for YOU in

SAN DIEGO

that smog-free coastal city in

CALIFORNIA

Convair (Consolidated Vultee Aircraft Corporation) is now accepting applications for the following positions in its modern, progressive Engineering Department:

Design Engineers	Servo Engineers
Design Draftsmen	Test Engineers
Electrical Draftsmen	Weight Engineers
Electronics Engineers	Aerodynamics Engineers
Microwave Engineers	Thermodynamics Engineers

WORKING FACTS: You get two holidays a week at Convair—overtime accomplished in 5-day week. Attractive salary ranges. An "engineers" engineering department . . . with stimulating, competent associates . . . and interesting, challenging, essential, long-range projects of a wide variety including—commercial aircraft, military aircraft, missiles, engineering research and electronic development. Excellent patent royalty arrangements. Top-notch retirement plan—better-than-average life and health insurance. Complete progress-salary review for each person twice yearly. Opportunity for continuing engineering education.

LIVING FACTS: San Diego, with its wonderful residential areas, offers you and your family incomparable living. Ideal climate—cool, clean, dry. Mountains, desert, Mexico, Hollywood, Los Angeles, Pacific Ocean, beaches and bay—only hours or minutes away. It offers you a new way of Life . . . pleasant, refreshing, happy.

If you qualify, you will receive generous travel allowances. *SEND COUPON NOW* for free booklets giving complete information.

THANK YOU

Mr. H. T. Brooks, *Engineering Department 200*
Convair, 3302 Pacific Hiway, San Diego, California

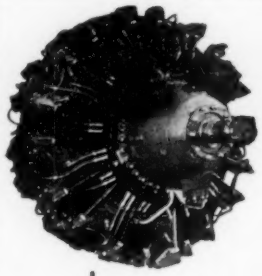
Please send me ***FREE*** booklets describing the Convair Opportunity for me and my Convair Application Form.

My name_____

Address_____

City_____ State_____

Occupation_____



R-2800's 31's-51's-75's

price $3150.00

These engines are 00:00 time since C.A.A. approved overhaul and have had ACES C.A.A. approved outside in lubrication system blower to thrust plates incorporated. They have also been block tested in our modern test cells and have been prepared for long term storage.

C.A.A. APPROVED OVERHAULS

- R 1340-AN-1 exchange only
- R-1830-92 ..... $2,700.00

ALL WORK AND ENGINE SALES CARRY OUR 100 hr. WARRANTY

AIR CARRIER ENGINE SERVICE Inc.

C.A.A. Approved Repair Station No. 3604 — Intl. Airport Branch — P. O. Box 236, Miami 48, Florida — Cable "ACENGSER"

ACES — AIR CARRIER ENGINE SERVICE, INC.

INSTRUMENTS

Authorized Factory Sales and Service

for

* Eclipse—Pioneer
* Kollsman
* U. S. Gauge

C.A.A. Approved Repair Station #3564

Contractors to U. S. Air Force

Our stock of instruments is one of the *largest in the East.*

IMMEDIATE DELIVERY

CALL • WIRE • WRITE

INSTRUMENT ASSOCIATES

Telephone: Great Neck 4-1147
363 Great Neck Road, Great Neck, N. Y.
Telegraph: WUX Great Neck, N. Y.

For Sale

DOUGLAS DC-3 (CONVERTED-C-47)

CUSTOM Executive Interior - - DIVANS - - Private Compartment

Total Hours to February 21, 1952

Airframe	2665
R/H Engine	585
L/H Engine	352

P&W R1830-92 Engines
6477A-O (Paddle) Propellers

RADIO EQUIPMENT:

2 Bendix MN62 ADFs, 1 each: Bendix RA10 Range Receiver, Bendix MN53 Marker Receiver, RTA1B 50-watt MF Transceiver, ARC 3 VHF Transceiver, ARC Tunable VHF Receiver, Collins 17L Transmitter, Collins 51R2 Omni & Localizer Receiver, Collins 51V Glideslope Receiver.

INCLUDED SPARES:

R1830-92 Engine, 6477A-O Propeller, Miscellaneous Accessories, and Instruments.

For Information, Write

FS-3812, Aviation Week
330 W. 42 St., New York 36, N. Y.

PRATT & WHITNEY ENGINES

R2000-7

Ready for Immediate Delivery

Engine time 00:00 since overhaul by Pacific Airmotive Corp., Burbank.

Modified to latest airline specifications, complete with carburetors, magnetos and harnesses. Preserved for long time storage.

Also 83696 and 78105 cylinders, plus selected R2000 parts.

P. D. SMITH
AIRCRAFT ENGINE PARTS
10901 SHERMAN WAY
SUN VALLEY, CALIF.

AIRPLANES FOR SALE

Douglas DC-3

We will replace our Douglas DC-3 equipment with Convairs this fall and winter. Will contract now for delivery as new equipment is delivered to us.

BRANIFF AIRWAYS, INC.
LOVE FIELD, DALLAS

Direct inquiries to:
Horace Bolding
Phone Dixon 1721

EXECUTIVE BOEING!!

WHAT OTHER EXECUTIVE AIRCRAFT WILL DO THIS JOB!!

- Speed 230 mph (T.A.S.)
- Range 3000 Miles
- Carry 20 to 25 Pass.
- Impossible to Overload
- Four Engine Safety
- Altitude Over 34,000 Ft.

This aircraft is fully converted ready to go anywhere in the world. Only 1350 hrs. since new on airframe.

THIS IS THE AIRPLANE YOU HAVE BEEN LOOKING FOR!

Wire or Call

LEEWARD AERONAUTICAL
Fort Wayne, Ind. Ph. H-2145 — or — Miami, Fla. Ph. 91218

AVAILABLE NOW

NORTH AMERICAN

AT-6's

We have 8 of the best AT-6's in the country. All are licensed and in flying condition. Low hours. These aircraft have been in service on our refresher course.

Make Offer!

LEEWARD AERONAUTICAL
Fort Wayne, Ind. Ph. H-2145 — or — Miami, Fla. Ph. 9128

1—DOUGLAS DC-3
(Now receiving complete overhaul prior to modification. Can finish to customer's specifications.)
1—EXECUTIVE LOCKHEED LODESTAR
(Now receiving complete overhaul prior to modification. Can finish to customer's specifications.)
for details:
STONNELL & HOLLADAY
National Airport — Washington, D. C.
Phone STerling 5753

New Sparkplugs

C34S & C35S
.40 ea.
L & H Supply Inc.
8202 Cedar Springs Dallas 9, Texas

2 WRIGHT 18-66 ENGINES

Zero time since new wrist tin bulletin just complied with new seals; freshly run-in; pickled and crated for shipment. Price: $3,000 each

WINGS, INC., Ambler, Pa.

IMPORTANT! ***Many items in this group have not been listed in previous ads!***

One of America's largest stocks of UNUSED

AIRCRAFT PARTS

We own and offer all parts listed — plus many thousands more — stocked in our Baltimore warehouse!

EXTRA SPECIAL!

OVER 6,000,000

AN525 WASHER HEAD SCREWS

All diameters and lengths, for example:

132,000	AN525-8-6	196,000	AN525-10-14
538,000	AN525-8-8	114,000	AN525-10-16
345,000	AN525-8-10	252,000	AN525-416-10
1,019,000	AN525-10-8	536,000	AN525-416-12
401,000	AN525-10-10	192,000	AN525-416-14
678,000	AN525-10-12	210,000	AN525-416-16

PLUS MANY OTHERS

43 PIECES

ENGINE QUICK CHANGE UNITS APPLICABLE TO GRUMMAN FM-1 AIRCRAFT. COMPLETE WITH ACCESSORIES

MISCELLANEOUS COMPONENTS

Quantity	Part No.	Mfg.	Description
45	AN4103-8	Clifford	Brass (Valve #U4785) Oil Cooler
38	18597-2	Airsearch	Aluminum Oil Cooler
180	MF9-713-15A	Vickers	Hydraulic Pump
700	TFD 8600	Thompson	Fuel Booster Pump
185	D7818	Adel	Anti-icer Pump
50	2P771-A	Pesco	Fuel Booster Pump
250	AN4014	Erie Meter	Wobble (D-3) Pump
300	1H260-K & KA	Pesco	Hydraulic Pump
19	AN5531-1	G. E.	Tach. Generator
1000	AN5780-2	G. E.	Wheel & Flap Position Indicator
400	AN5780-2	Weston	Wheel & Flap Position Indicator
16	76B19	Lewis Eng.	Cyl. Head Temp. Gauge
10	46B2	Lewis Eng.	Air Temp. Ind.
31	47B21	Lewis Eng.	Temperature Ind.
12	47B22	Lewis Eng.	Temperature Ind.
20	47B23	Lewis Eng.	Temperature Ind.
36	47B24	Lewis Eng.	Temperature Ind.
10	76Z2	Lewis Eng.	Air Temp. Ind.
11	76B4	Lewis Eng.	Temperature Ind.
20	77C4	Lewis Eng.	Temperature Ind.
21	77C5	Lewis Eng.	Temperature Ind.
85	727TY72Z2	Weston	Left Wing Anti-icing
88	727TY73Z2	Weston	Right Wing Anti-icing
83	727TY74Z2	Weston	Tail Anti-icing
11	2227-11D-3A	Eclipse	Dual Tachometer
44	5BA25DJ4B	G. E.	DC Motor (1/3 HP)
83	A4934	Delco	Motor
50	RDB2220	Holtzer Cabot	DC Motor
115	P4CA2A	Parker	Primer
70	AN3213-1	Scintilla	Ignition Switch
450	A-9 (94-32296)	Nesco	Ignition Switch
687	RS-2	Mallory	Selector Box
90	JH950-R	Jack & Heintz	Starter Motor
492	S-841 (94-32953)	Electronic Labs	Box
53	AN6203-3	Bendix	Accumulator 10"-1500 P.S.I.
1000	13018-A	Bendix	Interphone Box
140	K14949E	Marquette	Windshield Wiper Kit
188	EYLC-2334	Barber-Colman	Control
11	19086-1C	Eclipse	Amplifier
174	450-0	Skinner	Gasoline Filter
250	558-1A	Eclipse	Oil Separator
100	716-3A	Eclipse	Generator (NEA-3A)
37	117-47	Edison	Detector
89	318	Edwards	Horn
20	794-F	Stewart Warner	Heater
230	921-B	Stewart-Warner	Heater (200000 BTU)
340	981280	Kidde	CO_2 Cylinder
85	12924-2	Adel	Lock Valve
90	923748	Kidde	Oxygen Cylinder
80	DW28	Eclipse	Transformer
97	6041H-146A	Cutler Hammer	Relay (B-12)
22	0655-D	Aro	Oxygen Regulato
148	PG20RA51	Minn. Honeywel	Air Ramp Switch
33	DW47	Eclipse	Transformer
11	DW33	Eclipse	Transformer
65	ASDC2	CO_2 Mfg. Co.	Fire Detector
600	ND21	American Gas Accumulator Co.	Time Delay Relay
30	U6005-DV5	United Air Prod.	Oil Temp. Reg. 5"
29	UA-3160	United Air Prod.	Oil Temp. Reg. 6"
95	UA-3160C	United Air Prod.	Oil Temp. Reg. 6"
73	UA-6007-CF-DV5	United Air Prod.	Oil Temp. Reg. 7"
14	UA-6009-S-30	United Air Prod.	Oil Temp. Reg. 9"
11	UA-6012K-S30K	United Air Prod.	Oil Temp. Reg. 12"

CARBURETORS! MAGNETOS! SPARK PLUGS!

Quantity	Part No.	Description
247	PD12K10	Stromberg injection Carburetor
19	1375F	Holley carburetor
407	SF9LN-2 (manufacturer's part No. 10-12453-6 Spec. AN9511)	Bendix Scintilla Magneto
42	SF5RN-12 (manufacturer's part No. 10-26170-1)	Bendix Scintilla Magneto
185,000	LS4AD1	Spark Plug (Aero)
30,000	LS-6S9A	Bendix Scintilla Spark Plug

SPECIAL GROUP!

Ideal for tear-down for parts

Quantity	Part No.	Description
328	PD12K10	Stromberg injection carburetor
236	PR48-A1	Stromberg carburetor
29	PR48-A2	Stromberg carburetor
31	PR48-A3	Stromberg carburetor

PRATT AND WHITNEY AIRCRAFT ENGINE PARTS

Quantity	Part No.	Description
166	1045A	Bearing
500	3506	Flange
130	8288	Follower Ass'y
814	35814	Blower Ass'y
53	48362	Shaft
175	48363	Shaft
56	48392	Sump
390	48461	Gear
78	76236	Gear
1178	84289	Bearing
113	84487	Housing
77	84591C	Nose Housing
200	48350-D	Crankcase Ass'y
200	84083	Cylinder
100	84084	Cylinder
200	84085	Cylinder

HUGE STOCKS OF ALL TYPES *AN* HARDWARE NEW — UNUSED. WRITE FOR DETAILED LISTINGS.

BEARINGS AIRCRAFT

Quantity	Part No.
18000	K3L-2
8600	K3L-R48
4000	KF4
3000	KF4H
30000	KP4R16-2
3300	KSF5
17000	BC5W11
28000	KS6A
7000	38KD4
6600	RE3MR3
5000	F35-14

ACTUATORS

Quantity	Part No.
42	400AJ3
161	420 EC
160	420 DY
19	M-2031 (Air Associates)

★ ***Send us your material lists for screening!***

WRITE—WIRE—PHONE

COMMERCIAL SURPLUS SALES CO.

4101 CURTIS AVENUE, BALTIMORE 26, MARYLAND — **TELEPHONE: CURTIS 3300**

LETTERS ON CAA

(AVIATION WEEK's mail continues to be informative on CAA's Office of Aviation Safety. Here are more letters commenting on OAS, its recent reorganization and various distressing conditions of this vital CAA unit. Included is the ONLY letter we have yet received that takes issue with our editorial campaign to clean up certain CAA conditions. Employes' names are not published, to protect them from intimidation. It is obvious from the letters already printed that many fair-minded and conscientious CAA employes are indignant, and ashamed of the low point OAS has reached. Much of the material in these letters checks with our own investigation of the facts. We have officially requested more information from CAA authorities on some subjects and will hold up discussion on these points for about two weeks, to give the agency ample time to assemble data. Meanwhile, we remain convinced that the only way to bring a cleanup in this CAA unit is to bring out into the light of publicity as many shortcomings as possible. Too many facts and conditions have been hidden for years. Until a cleanup comes, effective campaigns for maximum safety are impossible of fulfillment.—R.H.W.)

Defending CAA's Horne

My comments on Admiral Horne's letter to you dated Mar. 21 follow:

The "responsible CAA officials" from whom the Admiral says Aviation Week made "no attempt to obtain the facts" concerning Aviation Safety's "reorganization" are mostly members, proteges or hangers-on of the Old Guard who have duped each new Administrator for over a decade.

If the Admiral would go back through the files he would discover that this is the third "reorganization" in six years, each of which was sold to a new Administrator by the same gang.

The Admiral would also discover that the latest "reorganization" is simply a return to the identical form of organization in effect when T. P. Wright became Administrator in 1945.

At that time, the same Old Guard convinced Mr. Wright that this form of organization was inefficient and obsolete and persuaded him to substitute a reshuffling of functions and titles so ludicrous that it never worked from the first day except insofar as their own selfish purposes were concerned.

Under Del Rentzel, the Old Guard considered it desirable to reshuffle half way back and now, under the Admiral, they have reshuffled back to where things were when Mr. Wright came in.

While playing these three shell games they have elevated favored members of their clique, a few at a time, into many of the top positions, built a gigantic empire, and created so much smoke screen, confusion, red tape and hokum that it is difficult for the industry or the public to determine who is responsible for anything.

The Old Guard has contrived a heinous combination which rules CAA with an iron hand and has become so powerful that it is difficult even for an Administrator to cope with them.

They have gradually established strength and they rule by tactics somewhere between those used by the former Pendergast and Capone mobs.

Either the Admiral does not know what really is, and has for years been, going on or he is reluctant to acknowledge that he cannot or will not expend his energies in attempting a sorely needed house cleaning.

For the time being, I give him benefit of the doubt. After all, a man who comes in near the top of an organization as large as CAA and who has every right to believe the men in charge of regions and technical divisions have ALL been chosen because of demonstrated competency, could not be expected to discover what has been going on through the years by talking only to Messrs. Hensley, William Davis, Young, Robertson, Franklin, Koch, Marriott, Lanter, Jurden, Vest, and others like them.

However, insofar as we know, there is as yet no regulation which prohibits the Admiral from conversing with the many fine CAA people who are not members of the Old Guard and who have the courage to "lay it on the line" if he can convince them he will fight to rid CAA of the leeches and reform a competent organization.

On the assumption that the Admiral has simply made the same honest mistake as some of his predecessors I suggest that he study in detail the past gross mishandling of vital safety matters by Messrs. Hensley and Davis, their predecessors, and other members of the Old Guard.

There are some classics in CAA files and some men inside and outside CAA who will be glad to assist him to a full understanding.

Wake up, Admiral. It is bad enough to have inefficiency in agencies where only dollars and cents are at stake. In an agency where the penalty for incompetence and lack of moral courage is doled out to innocent victims in the form of death and human suffering, those responsible must be cut out like the cancers they are.

An Employe of CAA's Office of Aviation Safety

Hensley-Davis 'Facts'

What Messrs. Hensley and Davis labeled "the facts" in their letter to Aviation Week published Mar. 31 are only a small portion of all the facts and, therefore, misleading. Their motives are very noble. But motives and accomplishment are not synonymous.

Hensley and Davis said they "sought and received advice from experts in the field of personnel selection and management. . . ." Why didn't they ask the experts to make the selections and subject themselves to the screening process along with the 310 others?

How naive must one be to believe their selection process was impartial? They established the requirements for the positions. They controlled the grades on the exams by basing 50% of the score on personal interviews and anyone who in spite of their efforts did receive a high grade could be passed over by their method of selecting their personnel from the top 25% of the list of eligibles.

We suggest Aviation Week review the qualifications required for the chief of the Air Carrier Safety Division and chief of the General Safety Division, both Grade GS-15. Why is no flying experience required for these two men who help establish policy and make important technical decisions?

The requirements for Hensley and Davis' chief of their Scheduled Operations Branch in Washington, a Grade GS-14, was 2,000 solo hours including 1,000 hours in multi-engine equipment, yet he must make many important technical decisions affecting the airlines.

Would you place a co-pilot in this position?

Their chief of Irregular Operations Branch, in Washington, Grade GS-14, was required to have 2,000 solo hours flight time including 1,000 hours in multi-engine equipment, and their chief of General Operations Branch in Washington, Grade GS-14, was required to have 2,000 solo hours.

None of their Division or Branch chiefs in the seven regions were required to have any flying time.

> A TOTAL of only 6,000 hours solo flight time which included 2,000 hours on multi-engine aircraft was required for the 29 top men in the Office of Aviation Safety. One average airline captain has as much flying experience. Is this what Messrs. Hensley and Davis meant by "technical qualifications"?

Why should a Section Chief be responsible for technical decisions when he can be overruled at any time by his Branch or Division Chief?

Will he be responsible for their technical decisions?

The Division Chief can and in many cases will have to make technical decisions, and he was selected primarily for his ADMINISTRATIVE ability!

Hensley and Davis said in their letter to Aviation Week that only 16 persons were involved in a physical change of station. Did they forget about the Section Chiefs? And what about the personnel in the district offices who have to be moved to fill positions left vacant?

How will the present organization insure that all airlines receive the same treatment in all regions? We in CAA are aware of many instances in the past where an airline is approved in one region and disapproved in another for the same operation. I fail to see

(Continued on p. 106)

ADVERTISERS IN THIS ISSUE

AVIATION WEEK—APRIL 21, 1952

ADEL DIV., GENERAL METALS CORP. 22
Agency—The McCarty Company

AERO SPARES COMPANY 45

AEROTEC CORPORATION, THE 41
Agency—Heintz & Co., Inc.

AIR ASSOCIATES, INC. 51

AIRBORNE ACCESSORIES CORP. 7
Agency—Gray & Rogers Adv.

AIRCRAFT-MARINE PRODUCTS, INC. 81
Agency—Rennet Advertisers

ALLEGHENY LUDLUM STEEL CORP. 64
Agency—Walker & Downing General Agency

ALUMINUM CO. OF AMERICA 59
Agency—Fuller & Smith & Ross, Inc.

AMC SUPPLY COMPANY 38
Agency—Parker Wilson Adv.

AMERICAN CHAIN & CABLE 86
Agency—Reiteke, Meyer & Finn, Inc.

AMERICAN PHENOLIC CORP. 82
Agency—Burton Browne Adv.

ARO EQUIPMENT CORP. 73
Agency—Beeson-Faller-Reichert, Inc.

ATLAS SCREW & SPECIALTY CORP. 62
Agency—Michel-Cather, Inc.

AUBURN SPARK PLUG CO., INC. 4
Agency—Richards & Webb, Inc.

AUSTENAL LABORATORIES, INC. 87
Agency—Frank C. Nahser, Inc.

BINKS MANUFACTURING COMPANY 40
Agency—Robertson & Buckley, Inc.

BOEING AIRPLANE COMPANY 47
Agency—N. W. Ayer & Son, Inc.

BRISTOL COMPANY, THE 85
Agency—James Thomas Chirurg Co.

CANNON ELECTRIC DEVELOPMENT CO. 69
Agency—Hixson & Jorgensen, Inc.

CARTER COMPANY, J. C. 88
Agency—West-Marquis, Inc.

CHAMBERSBURG ENGINEERING CO. 84
Agency—Willard G. Myers Adv. Agency

CHAMPION SPARK PLUG CO. 63
Agency—MacManus, John & Adams, Inc.

CHASE AIRCRAFT CO., INC. 8
Agency—Charles Blum Adv. Corp.

CITIES SERVICE OIL CO. 70
Agency—Ellington & Co., Inc.

CLARY MULTIPLIER CORP. 58
Agency—Batten, Barton, Durstine & Osborn, Inc.

COLORADO FUEL & IRON CORP., THE 51
Agency—Doyle, Kitchen & McCormick, Inc.

DARNELL CORPORATION, LTD. 46
Agency—Rhea Advertising Service

DOW CHEMICAL CO. 76
Agency—MacManus, John & Adams, Inc.

DUMONT AVIATION ASSOCIATES 90
Agency—Edward S. Kellogg Co.

EATON MANUFACTURING CO. 23
Agency—Clark & Bickerd, Inc.

ECLIPSE-PIONEER DIV. OF BENDIX AVIATION CORP. 89
Agency—MacManus, John & Adams, Inc.

EDISON, INC., THOMAS A. 67
Agency—Gotham Adv. Co., Inc.

EDO CORPORATION 32
Agency—Davis-Parsons, Inc.

ELECTRICAL PRODUCTS CORP. 77
Agency—The McCarty Co.

EX-CELL-O CORPORATION 45
Agency—Holden-Clifford-Flint, Inc.

FAFNIR BEARING CO., THE 5
Agency—Horton-Noyes Co.

FAIRCHILD ENGINE & AIRPLANE CORPORATION ..... Third Cover
Agency—Buchanan & Co., Inc.

GENERAL ELECTRIC COMPANY ..... 27, Fourth Cover
Agency—G. M. Basford Co.

GILFILLAN BROS. 74
Agency—Erwin, Wasey & Co., Ltd.

GOODRICH CO., THE B. F. 3
Agency—Batten, Barton, Durstine & Osborn, Inc.

GRAND CENTRAL AIRCRAFT CO. 71
Agency—Owsar Nordin Co.

GRUMMAN AIRCRAFT ENGINEERING CORP. ..... Front Cover
Agency—Charles W. Hoyt Co., Inc.

GULF OIL CORPORATION 68
Agency—Young & Rubicam, Inc.

HANSEN MFG. CO., THE 96
Agency—Richard T. Brandt, Inc.

HARTMAN ELECTRICAL MFG. CO. 95
Agency—Palm & Patterson, Inc.

HARTWELL AVIATION SUPPLY CO. 34
Agency—The McCarty Company

HOLLINGSHEAD CORP., R. M. 50
Agency—Campbell-Mithun, Inc.

HOWARD INDUSTRIES, INC. 24
Agency—Gerstel Leeff Adv.

HUFFORD MACHINE WORKS 54
Agency—Clyde D. Graham Adv.

HYDRO-AIRE, INC. 19
Agency—John H. Riordan Co.

JOHNS-MANVILLE CORP. 48
Agency—J. Walter Thompson Co.

LEWIS ENGINEERING CO., THE 72

MACWHYTE COMPANY 10
Agency—Needham, Louis & Brorby, Inc.

MARMAN PRODUCTS CO., INC. 76
Agency—West-Marquis, Inc.

MARQUARDT AIRCRAFT COMPANY 62
Agency—The Ecolg Company

McCULLOCH MOTORS CORP. 105
Agency—West-Marquis, Inc.

MINNESOTA MINING & MFG. CO. 31
Agency—MacManus, John & Adams, Inc.

MONADNOCK MILLS 36
Agency—H. B. Humphrey, Alley & Richards, Inc.

NORTH AMERICAN AVIATION, INC. 60
Agency—Batten, Barton, Durstine & Osborn, Inc.

NORTHROP AIRCRAFT, INC. 62
Agency—West-Marquis, Inc.

NYLOCK CORP., INC. 33
Agency—Burke Dowling Adams, Inc.

PIONEER TOOL ENGINEERING, INC. 79
Agency—Clyde D. Graham Adv.

PROPELLER SERVICE CORP., THE 28
Agency—Charles Palm & Co.

REMINGTON RAND, INCORPORATED 80
Agency—Leeford Adv. Agency, Inc.

REYNOLDS METALS COMPANY 33
Agency—Price, Robinson & Frank, Inc.

ROHM & HAAS COMPANY 25
Agency—John Falkner Arndt & Co., Inc.

RUSSELL REINFORCED PLASTICS CORP. 49
Agency—Rex Ceder Adv.

SAFE FLIGHT INSTRUMENT CORP. 38
Agency—Davis Parsons, Inc.

SEARCHLIGHT SECTION 97, 98, 99, 100, 101, 102, 103

SERVICE STEEL COMPANY 39
Agency—Claude R. Whipple Adv.

SERVOMECHANISMS, INC. 97
Agency—Sanger-Funnell, Inc.

SOUTH BEND LATHE WORKS 57
Agency—Lamport, Fox, Prell & Dolk, Inc.

STEEL PRODUCTS ENGINEERING CO., THE 60
Agency—Geyer, Newell & Ganger, Inc.

STEWART WARNER CORP. 83
Agency—MacFarland, Aveyard & Co.

SUNDSTRAND MACHINE TOOL CO. ..... Second Cover
Agency—Howard H. Monk & Assoc.

TAYLOR-WINFIELD CORP. 66
Agency—Meek & Thomas, Inc.

TEXAS ENGINEERING & MFG. CO. 56
Agency—Taylor-Norsworthy, Inc.

THOMPSON CO., H. I. 75
Agency—Hixson & Jorgensen Adv., Inc.

TOWNSEND COMPANY 35
Agency—Bond & Starr, Inc.

TRANS WORLD AIRLINES, INC. 96
Agency—Batten, Barton, Durstine & Osborn, Inc.

TUBE METHODS, INCORPORATED 93
Agency—John Miller Adv. Agency

TUBING APPLIANCE COMPANY 52
Agency—Byron H. Brown & Staff

UNITED AIRCRAFT CORP. 43
Agency—Geyer, Newell & Ganger, Inc.

UTICA DROP FORGE & TOOL CORP. 78
Agency—Wilson, Haight & Welch, Inc.

WHITE DENTAL MFG. CO., S. S. 21
Agency—Peterson & Kempner, Inc.

WHITTAKER & CO., LTD., WM. R. 44
Agency—Mogge-Privett, Inc.

WICKWIRE SPENCER STEEL DIV., THE COLORADO FUEL & IRON CORP. 51
Agency—Doyle, Kitchen & McCormick, Inc.

WIGGINS OIL TOOL CO., INC., E. B. 79
Agency—Welsh-Hollander Adv.

WITTEK MANUFACTURING COMPANY 29
Agency—The Advertising Corp.

WYMAN GORDON CO. 6
Agency—John W. Odlin Co., Inc.

Z & W MACHINE PRODUCTS, INC. 86

SEARCHLIGHT SECTION

(Classified Advertising)

H. E. Hilty, Mgr.

EMPLOYMENT
Positions Vacant 98–101
Selling Opportunities Offered 101
Positions Wanted 98

EDUCATIONAL
Schools 98

PLANES—EQUIPMENT
(Used or Surplus New)
For Sale 101–103

WANTED
Equipment 101

TURBOWIND

AXIAL-FLOW BLOWERS

Now Available in Large or Small Quantities

We welcome inquiries on high or low cycle a-c, single or three phase, Turbowind blowers with capacities up to 20" static head and up to 5,000 cfm; d-c units are also available. Standard models are available to fit most applications. Where standard models are not applicable, custom designs using stock Turbowind components can be produced efficiently.

General Characteristics of *Turbowind* Axial-flow Blowers

We design and manufacture our own motors to obtain correct matching of blower and motor. Motors are designed to meet military specifications. All blowers feature light weight and compact design. Aerodynamic blading provides high-efficiency air flow.

Typical Applications of *Turbowind* Blowers

Ventilating . . . heating . . . cooling . . . exhausting . . . pressurizing . . . cooling electronic equipment . . . de-icing.

For further information, call or write:

Rhodes-Lewis Co.
SUBSIDIARY

McCULLOCH
MOTORS CORPORATION

6151 West 98th Street
Los Angeles 45, California

LETTERS ON CAA

(Continued from p. 104)

how a Division Chief, endowed with ADMINISTRATIVE but not technical ability, will solve this problem.

I would like to know who wrote the letters for the Administration from which Hensley and Davis quote so frequently. Was it these two gentlemen?

> From the many Hensley-Davis references to planning, supervision and management, it would appear they are planning to supervise their agents to impotence and manage safety out the window. I suggest they plan to decrease the accidents and many near accidents; program more safety and less reorganization; evaluate their own performance and policies; and stop swamping their agents with so much supervision that they are deluged in paper work and reports.

"Safety is no accident," Messrs. Hensley and Davis say; "It must be planned." What are they planning to do about airplanes that have rained down on the greater New York area?

- What are their plans concerning air carrier pilot training?
- What are their plans for establishing more realistic minimums?
- What are their plans about C-46s taking off with 48,000 lb. over highly congested areas?
- What are they planning to do about three-engine ferry takeoffs over congested areas?
- What are their plans for preventing collisions between aircraft flying on instruments off airways, over uncontrolled airways routes and into uncontrolled airports?
- What are their plans for improving deteriorating line maintenance on some airlines?
- What are their plans for preventing collisions of aircraft practicing instrument flight around busy terminals?
- What are their plans for preventing collisions of aircraft in marginal weather and/or poor visibility in the vicinity of heavily congested terminals?
- What are their plans for improving pilot visibility in transports?
- What are their plans for recommending modernization of Civil Air Regulations?

An Emplove of CAA's Office of Aviation Safety

CAA & Smuggling

. . . Because of the New York Journal-American's known rabble-rousing technique, I was very disappointed when Aviation Week reprinted the Journal-American's charges against Civil Aeronautics Administration officials. This is the first time I have known Aviation Week to deal unfairly with a subject on aviation.

I have been active with Resort Airlines as manager in the Miami area, and as manager of predecessor companies operating between Miami and all points in the Caribbean since 1945. I have personally flown countless flights to and within this area, and have been in close contact with all of our operations in the past.

I can truthfully say that the charges made by the Journal-American as regards gratuities accepted by CAA inspection agents are completely without foundation.

I have witnessed cases where CAA men have brought back with them a bottle or two of rum along with other mementos from the islands, but it is ridiculous to charge or assume that they have ever taken advantage of our pilots or of the companies involved.

Resort Airlines, Inc., wishes to go on record by stating that the CAA organization at Miami and those agents assigned to it have never taken advantage of their position in their relationship with our activities. Our relations with this organization have been extremely pleasant and all concerned appear to be doing their duty in the application and enforcement of the Civil Air Regulations. I certainly hope the unjustified charges will be withdrawn.

R. PAUL WEESNER, President
Resort Airlines
Miami 48, Fla.

(We are glad Resort can report a clear record. CAA never denied the original story until after we reprinted it. Even yet, the Administrator has failed—despite our request—to make public to us his report, assembled by his committee, on which he bases his claim that charges were false.—R.H.W.)

Oklahoma Whiskey Runs

With reference to Mr. Horne's denial of CAA smuggling in the Mar. 31 issue of Aviation Week, I would like to add a couple of comments:

I have been employed by the CAA Aeronautical Center here in Oklahoma City for the past [we censor for the writer's protection] years and if flying liquor into Oklahoma, a dry state, is called smuggling, CAA is guilty.

Frequent trips have been made to Joplin, Mo., and cities in Texas, and by knowing when a "whiskey man" was to come back, practically anyone at this installation could have any type of liquor brought in.

Was Joplin, Mo., selected for these "training" flights because of its most modern navigational facilities? Liquor and cigarets are cheaper in Missouri than in any of the other neighboring states and Joplin is the nearest city. Self explanatory!

Wichita Falls, Tex., has been another popular stop because free transportation is furnished by the airport and a nearby liquor store gives rates to CAA personnel.

A couple of years ago the local employes held an annual party and the afternoon prior to this party, liquor was on sale in the stockroom of the maintenance hangar. The stock did not consist of a few bottles but several cases, and they had been flown from Texas in a CAA airplane.

These "whiskey runs" have been going on for several years and when local top management gets their supply through these means I wouldn't say that they disagree.

I would like to congratulate your magazine for exposing some of the many inefficiencies of the CAA. . . . Don't drop the fight.

A CAA Emplove in Oklahoma City, Okla.

'Crashes Out of Compromise'

I am not surprised that the authenticity of your editorials have been attacked by those in control of CAA information because the shoe has definitely begun to pinch. . . . Functions heretofore performed by trained specialists are now being performed by men who have no experience in the specialty. Example: Deputy Chief of the Air Carrier Safety Division. He has had no previous air carrier experience. . . .

Next, consider the "advice of experts" (unnamed, of course) in the field of personnel selection, who set up the screening, examining and selection procedure. One of the honest men who was assigned to assist in this states without hesitation that the whole thing was dishonest and a farce, and so unfair that it is without precedent.

Federal Airways Office was reorganized several months ago, so there was definite precedent to follow. That reorganization, however, was fair and impartial, and therefore unacceptable, especially when the underlying motive was to get rid of those people who proved that they were safety men, and in so doing proved that they would not operate under the wraps of outside influence.

We will always have crashes which arise out of compromise. . . .

The CAA's National Promotion Plan has been in disfavor the past few years because 40% of the total score is based on the same objection now raised to the current reorganization—personal opinion, with little or no regard for the man's experience and ability. . . .

As to the written test, this was the dilly. ("Well, Mr. Jones, you did well in everything except the written examination, so naturally you appear in the lower 50% of the register.")

I would challenge them to produce a copy of this examination for evaluation by any expert in this field. . . . I know it to be an uncontroverted fact that of the five possible answers given for each question any one is correct and highly argumentative. The so-called correct answer to each question was arrived at by consensus. As you will note, the Hensley-Davis letter did not indicate how each final score was determined. This is the fatal error, in my opinion, because if they were forced to defend it the murder would be out.

Don't believe for one minute that their answer to your editorials satisfies anyone. Saw off the barrel of your shotgun and fire. We little fellows are indebted to you for your fight against injustice.

If what you have written "affords grounds for action," I offer my services free of charge in defense. Apparently they have not been advised that truth even in Washington is a good defense to defamation.

Emplove of CAA's Office of Aviation Safety.

300 Mile Hike

WITHOUT A SINGLE BLISTER

The marines have landed! Torn roads, blasted bridges, raging rivers can't hold back the steady, abundant flow of supplies vitally needed for victory. Guns, drugs, plasma, clothes are flown over impassable terrain by Fairchild's battle-proved "Flying Boxcar."

Battle-proved to deliver dependably—with or without an airfield—rugged and versatile for any combat assignment, the Fairchild C-119 lives up to its designers' intentions, giving speed, stamina, and utility under toughest conditions. It never lets our armed forces down! That's why the C-119 is number one all-purpose transport for military airlift operations of the UN forces in Korea, in Europe and in the United States.

ENGINE AND AIRPLANE CORPORATION

FAIRCHILD *Aircraft Division*

Hagerstown, Md.

Engine, Stratos Divisions, Farmingdale, N. Y. Guided Missiles Division, Wyandanch, L. I., N. Y.

Here's why
THE NEWEST AND BIGGEST AIRLINERS ARE BEING EQUIPPED WITH G-E ELECTRICAL SYSTEMS

Lockheed's new model Constellations, and all Super-Connies use General Electric protective systems. G-E provides the fastest possible tripping of overvoltage faults—and freedom from nuisance tripping.

G-E provides the only positive method of isolating a faulty generator without affecting service. That's one reason why all of Pan American's Boeing "Strato" Clippers use G-E systems.

New Douglas DC-6B's being built for Pan American World Airways will be equipped with G-E electrical systems. G-E provides the most complete electrical protective systems ever placed in production for commercial transport-type aircraft.

The country's first turboprop transport—the Convair-Allison Turboliner—is equipped with a G-E electrical system. G-E systems are tailor-engineered to give the protection you need for ordinary or special applications.

The list of planes using G-E protective systems is a roll call of today's most popular aircraft. Are your planes listed among them?

One serious fault that damages electrical equipment in just one of your aircraft could cost you more than G-E protective systems for your entire fleet. Can you afford *not* to investigate?

For more complete information get the new fact-crammed bulletin GEA-5628. Telephone your General Electric aviation specialist or write General Electric Company, Section 210-16, Schenectady 5, New York.

You can put your confidence in—

GENERAL ELECTRIC

210-16